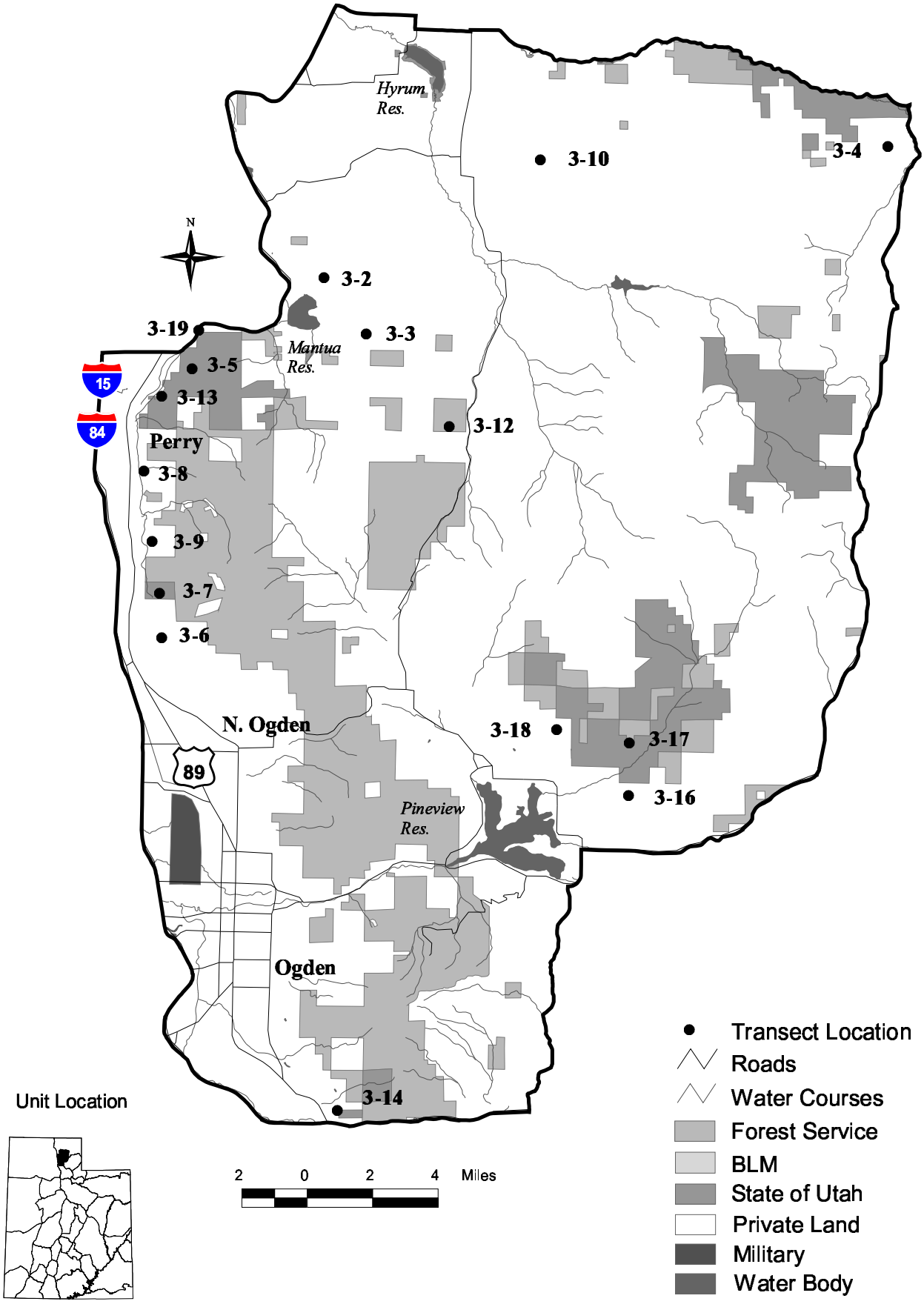
Management Unit 3



MANAGEMENT UNIT 3 - OGDEN

Boundary Description

> **Weber, Box Elder, Cache and Morgan counties** - Boundary begins at Hyrum and SR-101; east on SR-101 to the Ant Flat Road (at Hardware Ranch); south on this road to SR-39; west and south on SR-39 to SR-167 (Trappers Loop Road); south on SR-167 to SR-30 at Mountain Green; west along SR-30 to Interstate 84; west on I-84 to Interstate 15; north on I-15 to US-91; east and north on US-91 to SR-101; east on SR-101 to Hyrum.

The Ogden deer herd unit is located within Weber, Cache, Box Elder and Morgan counties. Municipalities located within or along the unit boundaries include: Hyrum, Wellsville, Mantua, Perry, Willard, Ogden, Mountain Green and Huntsville. The major drainages are the Little Bear River, Ogden River and Box Elder Creek. Smaller drainages are Davenport Creek, Paradise Dry Canyon, Hyrum Dry Canyon, Hyrum Green Canyon, Perry Canyon and Willard Canyon. The topography is steep and rough on the western face of the Wasatch Mountains above Willard, Perry, Ogden, east of Avon and Paradise, and more gentle in-between. Elevation ranges from 4,400 feet near Willard to 9,764 feet on Willard Peak. According to the most recent Utah Big Game Management Plan (1998), there is approximately 233,469 acres of useable deer winter range in the unit. Summer range totals 152,887 acres. A majority of the winter range (82%) and summer range (72%) is on private land. The U.S. Forest Service administers 19% of the summer range and 13% of the winter range. The Division of Wildlife Resources maintains 6% of the deer summer range and 5% of the winter range on the unit.

Major deer wintering areas are found between 4,600 feet and 7,000 feet on the Wasatch face above Willard and Perry; between 5,100 to 7,000 feet north and east of Mantua Reservoir; from 5,600 to 7,000 feet in the Three-Mile Canyon; and between 5,400 and 7,000 feet along the slopes on the southeast side of Cache Valley above Paradise and Avon. During severe winters, snow restricts deer use to Three-Mile Canyon, the East Fork of the Little Bear River, the area south of Porcupine Reservoir, Paradise Dry Canyon, Hyrum Dry Canyon, Perry Canyon and the southeast corner of the unit south of Willard (King and Muir 1971).

Management unit 3 supports approximately 135,907 acres of useable elk summer range and 165,542 acres of elk winter range. Approximately 80% of the summer and 81% of the winter range is privately owned. Most of the remaining range is administered by the U.S. Forest Service and the Division of Wildlife Resources.

Big Game Management Objectives

Unit management objectives for mule deer are to achieve a modeled target population size of 12,000 wintering deer, and a postseason buck-doe ratio of 15:100 with 30% of these bucks being 2-point or better. Unit management elk objectives call for 1,200 wintering elk with the postseason herd composition consisting of a bull to cow ratio of 8:100, with at least half of these bulls being 2½ years of age or older (DeBloois et. al 2001). The overall trend for mule deer fawns/100 does over the past decade appears to be fairly stable, averaging just over 70 fawns/100 does. The high was 96 fawns/100 does in 1998-99, while the low was 45 in 1993-94 (Evans et. al 1996, DeBloois et. al 2001). Continued urbanization and loss of critical winter range on this unit may jeopardize target herd unit objectives.

Study Site Description

Management unit 3 contains a total of 17 trend studies, all of which are located within the winter range. Twelve of these studies were established in 1984, the other five in 1985. All were reread in 1990 and 1996. In 2001, 8 studies were reread, while 9 studies were suspended. Studies were suspended for several reasons. These included the lack of wildlife use, urban development, and sites not being rehabilitated following wildfires resulting in the loss of key browse, primarily sagebrush. Suspended sites will be reevaluated during the next rotation in 2006 to determine whether they will be reread or permanently suspended. Detailed location descriptions, data tables, and a written summary for each study follow.

Trend Study 3-2-01

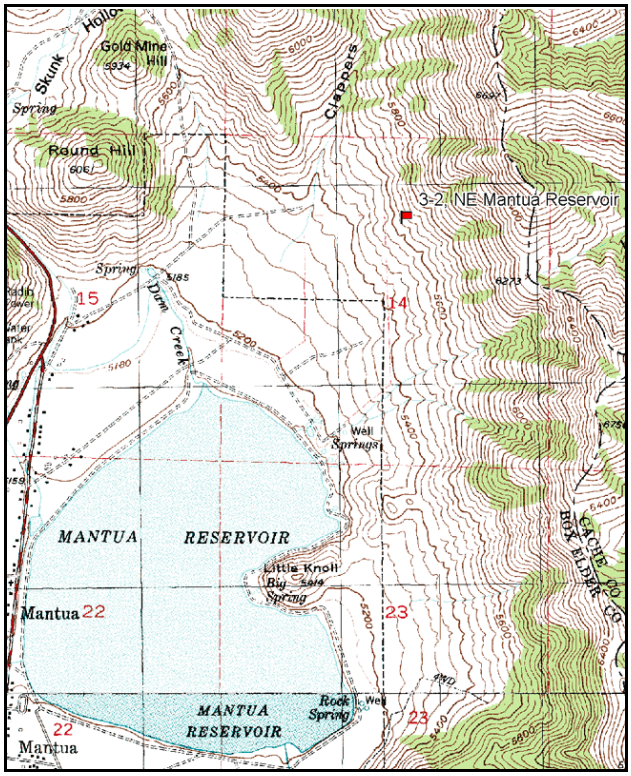
Study site name: NE Mantua Reservoir . Vegetation type: Big Sagebrush-Grass .

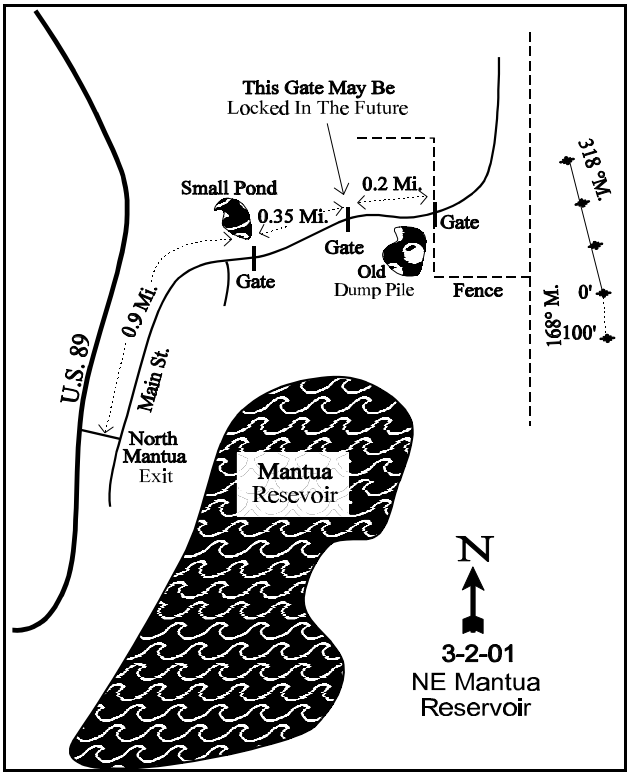
Compass bearing: frequency baseline 168 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (59ft), line 3 (71ft), line 4 (34ft).

LOCATION DESCRIPTION

Turn east off of U.S. 89-91 at the north Mantua exit and travel east to main street in Mantua. Turn left (north) on main street and proceed 0.9 miles to a gate with a small pond to the left. Proceed through the gate, stopping at another gate after 0.35 miles (this gate may be locked in the future). Proceed 0.2 mile to another gate with an old dump to the south. From the gate walk south-east to a "T" in the fence. From the "T" in the fence, walk 60 paces at a bearing of 112 degrees magnetic to the 0-foot baseline stake. Baseline 0-foot stake is marked by browse tag #7105. The first 100 feet of the baseline runs south at a bearing of 165 degrees magnetic. The last 300 feet run north off of the 0-foot stake at a bearing of 318 degrees magnetic.





Map Name: Mount Pisgah

Diagrammatic Sketch

Township 9N , Range 1W , Section 14

UTM 4596798 N 423322 E

DISCUSSION

Trend Study No. 3-2

The Northeast Mantua Reservoir study samples a mountain big sagebrush community about 1 mile from Mantua Reservoir. The site lies on a moderately steep (25%), west facing slope. Elevation is approximately 5,600 feet. Big game use of this site was light in both 1996 and 2001. A pellet group transect read along the baseline in 2001 estimated 21 deer days use/acre (51 ddu/ha), while no elk pellets were sampled in the transect. Quadrat frequency of deer and elk pellet groups was low in 1996 and 2001. Domestic livestock use the surrounding area in summer, but appear to have had little impact on the immediate area. No cattle pats were sampled in 2001 in either the pellet group transect or within the quadrats.

The NRCS mapping unit describing the site is entitled "Goring-Yates Hollow Association, Moderately Steep." Soils in this unit are alluvially deposited from sandstone and quartzite parent material. These are deep, well drained soils. Soils are clay in texture in the upper horizons and a clay loam grading to a more gravelly clay below. Complete drying of the soil seldom occurs below a depth of 12 inches. Although erosion hazard is moderate (Chadwick et al. 1975), an erosion condition classification determined soils to be stable in 2001 due to adequate vegetation and litter cover. Soils are slightly alkaline (pH of 7.4) and contain moderately high organic matter (3.6%). Effective rooting depth (see methods) was estimated at 15 inches in 1996.

Browse composition at the site is dominated by a moderately dense and stable population of mountain big sagebrush. A stand of antelope bitterbrush, a more preferred species, occurs near the original study, but for some reason, no attempt was made incorporate it into the sample. These bitterbrush plants display heavy use but appear vigorous. On the study site, mountain big sagebrush provides 90% of the total browse cover with a population of approximately 1,800 plants/acre. Mature plants are vigorous and relatively large, with an average height of over 2 feet and a crown of nearly 4 feet. Utilization was heavy in 1984, but has been light to moderate since then. Percent decadency was low from 1984-1996, averaging 15%. Although it did increase somewhat in 2001 to 26%. The number of dead plants in the population more than doubled between 1996 and 2001. Currently (‘01) the dead to live ratio is 1 to 4. However, recruitment of young sagebrush has been relatively high in 1996 and 2001 at 17% and 15% respectively. It appears adequate to maintain the population at the present time. Annual leader growth averaged just over 3 inches in 2001.

Other shrubs include occasional individuals of antelope bitterbrush, Rocky Mountain maple and bigtooth maple. Of particular interest is a small population of Stansbury cliffrose and cliffrose/bitterbrush hybrids growing slightly north of the study site. Broom snakeweed was encountered during the 1996 reading with the much larger sample size beginning to be used at that time. Snakeweed density is estimated at 740 plants/acre in 2001.

A vigorous herbaceous understory is associated with the mountain big sagebrush. Perennial grasses comprise a substantial portion of the herbaceous composition. However, annual brome grasses were abundant and accounted for 64% of the grass cover in 1996. Total grass cover contributed by annual grasses decreased to 43% in 2001. This is most likely due to several consecutive years of drought. Bulbous bluegrass is also abundant and has significantly increased in sum of nested frequency with each reading. Bluebunch wheatgrass remains at stable quadrat and nested frequency values in 2001. Other perennial grasses include small numbers of Kentucky bluegrass and Sandberg bluegrass.

A wide variety of forbs of varying growth forms were also found on the site. All forbs combined produced less than 5% total average cover in 1996, increasing to over 14% in 2001. This increase in forb cover is due to the increases in both perennial and annual species. The most common perennial forbs include western yarrow, arrowleaf balsamroot and yellow salsify. The most abundant annual species are willowweed and storksbill. Dyers woad, a noxious weed, is present on the site in low numbers.

1984 APPARENT TREND ASSESSMENT

Although much of the west facing slope surrounding the study area appears to be progressing toward grass-forb dominance, the study site appears to be a relatively stable big sagebrush community. Use is mostly heavy (81%), but vigor is good and percent decadency is within the acceptable range for sagebrush at 15%. Soil trend also appears relatively stable with only minor erosion occurring.

1990 TREND ASSESSMENT

Density of mature big sagebrush increased by 19% on the density plots (from 1,732 to 2,132 plants/acre). Plants show light to moderate hedging and have good vigor. There is a robust population of young sagebrush and few decadent plants. Trend is up for browse. Trend for herbaceous species is stable. Sum of nested frequency for perennial grasses increased while that of forbs decreased. Trend for soil is stable with no significant changes in the elements of ground cover.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - stable, but noticeable increase in bulbous bluegrass (3)

1996 TREND ASSESSMENT

Trend for soil is up with a significant decline in percent bare ground (16% to 5%). Litter cover remained similar and pavement and rock cover declined from 16% to 9%. Trend for browse is stable. The sagebrush density has remained similar between readings, utilization is light to moderate, vigor good, and percent decadence low at 14%. Reproduction remains high at 17%, which is adequate to maintain the population. The herbaceous understory is dominated by annual brome grasses. Trend is down due to a decline in the sum of nested frequency for perennial grasses and forbs. A low value species, bulbous bluegrass, is the only perennial species that increased in sum of nested frequency. Forbs are diverse but not abundant. Dyers woad is still not abundant, although it has doubled in its sum of nested frequency value since 1990.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - down and dominated by annual grasses (1)

2001 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover remain high and percent bare ground remains low. Trend for browse is stable. Mountain big sagebrush shows mostly light to moderate use, good vigor and adequate recruitment from young plants. Percent decadency did increase from 14% to 26%, but the current level is not excessive especially with several consecutive years of drought. Trend for the herbaceous understory is up as sum of nested frequency for perennial grasses and forbs nearly doubled.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up (5)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 2

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	a140	b204	ab163	ab167	71	79	61	61	5.26	6.80
G	Bromus japonicus (a)	-	-	b349	a201	-	-	96	72	16.42	3.60
G	Bromus tectorum (a)	-	-	a36	b179	-	-	14	57	.86	7.52
G	Koeleria cristata	-	-	2	6	-	-	1	4	.00	.12
G	Melica bulbosa	7	3	-	-	3	1	-	-	-	-
G	Poa bulbosa	a5	b41	c79	d192	2	17	30	67	4.22	7.69
G	Poa fendleriana	4	-	-	-	1	-	-	-	-	-
G	Poa secunda	ab20	c113	a12	b41	12	42	6	18	.05	.35
Total for Annual Grasses		0	0	385	380	0	0	110	129	17.28	11.13
Total for Perennial Grasses		176	361	256	406	89	139	98	150	9.54	14.97
Total for Grasses		176	361	641	786	89	139	208	279	26.82	26.10
F	Achillea millefolium	b119	a47	a57	a82	47	21	22	33	1.41	1.87
F	Agoseris glauca	-	3	1	-	-	1	1	-	.00	-
F	Allium acuminatum	2	-	-	-	1	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	a94	b205	-	-	35	75	.20	1.60
F	Artemisia ludoviciana	1	5	3	4	1	4	1	2	.15	.41
F	Aster chilensis	-	-	-	7	-	-	-	2	-	.30
F	Astragalus spp.	b32	b30	a-	a8	16	13	-	4	-	.07
F	Balsamorhiza sagittata	17	20	13	14	9	11	6	8	.66	1.94
F	Camelina microcarpa (a)	-	-	-	-	-	-	-	-	-	.03
F	Calochortus nuttallii	ab5	a-	ab3	b10	2	-	1	5	.00	.05
F	Cirsium undulatum	-	-	2	-	-	-	1	-	.00	-
F	Collomia linearis (a)	-	-	a5	b22	-	-	2	10	.01	.07
F	Comandra pallida	-	-	-	9	-	-	-	4	-	.04
F	Collinsia parviflora (a)	-	-	-	1	-	-	-	1	-	.00
F	Epilobium brachycarpum (a)	-	-	b155	a64	-	-	66	27	1.39	.21
F	Erodium cicutarium (a)	-	-	a3	b76	-	-	1	23	.03	2.55
F	Eriogonum umbellatum	-	-	-	1	-	-	-	1	-	.00
F	Galium aparine (a)	-	-	-	3	-	-	-	1	-	.03
F	Hackelia patens	a3	b35	a3	a11	1	16	2	6	.06	.16
F	Hedysarum boreale	-	-	-	2	-	-	-	1	-	.03
F	Holosteum umbellatum (a)	-	-	a-	b15	-	-	-	7	-	.20
F	Isatis tinctoria	3	9	18	9	2	5	9	6	.24	.08
F	Lappula occidentalis (a)	-	-	5	5	-	-	2	3	.01	.39

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Lactuca serriola	$_{a}$-	$_{a}$3	$_{a}$-	$_{b}$30	-	1	-	17	-	.24
F	Lithospermum ruderale	$_{ab}$2	$_{a}$-	$_{ab}$2	$_{b}$11	2	-	2	5	.18	.38
F	Lomatium spp.	-	-	-	2	-	-	-	1	-	.00
F	Lupinus argenteus	$_{a}$-	$_{a}$-	$_{ab}$4	$_{b}$9	-	-	2	5	.21	.39
F	Madia glomerata (a)	-	-	2	-	-	-	1	-	.00	-
F	Microsteris gracilis (a)	$_{b}$54	$_{a}$-	$_{a}$3	$_{a}$6	26	-	1	2	.00	.01
F	Polygonum douglasii (a)	-	-	7	8	-	-	5	3	.03	.04
F	Ranunculus testiculatus (a)	-	-	2	5	-	-	1	3	.00	.01
F	Rumex spp.	-	-	-	3	-	-	-	1	-	.03
F	Senecio multilobatus	-	-	-	1	-	-	-	1	-	.03
F	Tragopogon dubius	$_{c}$122	$_{b}$74	$_{a}$12	$_{c}$109	56	34	4	51	.04	2.66
F	Unknown forb-perennial	-	5	-	-	-	3	-	-	-	-
F	Veronica biloba (a)	-	-	$_{a}$9	$_{b}$27	-	-	3	10	.01	.12
F	Wyethia amplexicaulis	$_{b}$14	$_{a}$-	$_{a}$3	$_{a}$-	8	-	1	-	.03	-
F	Zigadenus paniculatus	-	-	7	-	-	-	2	-	.04	.01
Total for Annual Forbs		54	0	285	437	26	0	117	165	1.70	5.30
Total for Perennial Forbs		320	231	128	322	145	109	54	153	3.05	8.74
Total for Forbs		374	231	413	759	171	109	171	318	4.76	14.04

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 2

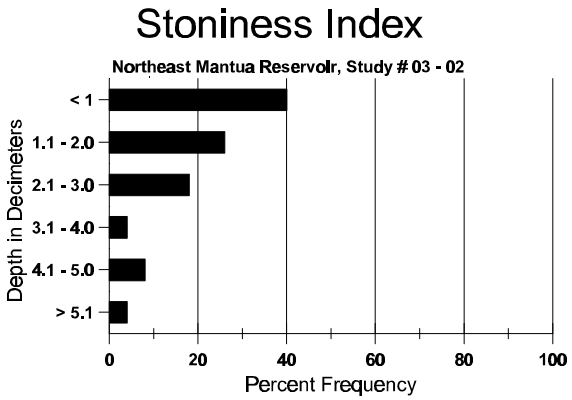
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	60	55	16.34	15.71
B	Gutierrezia sarothrae	11	13	.36	.78
B	Prunus virginiana	2	2	.00	.15
B	Purshia tridentata	1	1	.66	.85
Total for Browse		74	71	17.37	17.49

BASIC COVER --
Herd unit 03 , Study no: 2

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	385	381	3.25	10.25	50.70	55.77
Rock	203	148	6.75	4.75	5.68	4.36
Pavement	207	200	6.50	11.75	3.84	3.82
Litter	399	378	66.00	57.25	58.45	45.47
Cryptogams	-	-	0	0	0	0
Bare Ground	167	170	17.50	16.00	5.36	9.88

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 02, NE Mantua Reservoir

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.1	66.0 (14.0)	7.4	22.0	36.4	41.6	3.6	29.4	179.2	.5



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 2

Type	Quadrat Frequency	
	'96	'01
Rabbit	-	2
Elk	-	1
Deer	5	10
Cattle	2	-

Pellet Transect	
Pellet Groups per Acre	Days Use per Acre (ha)
01	01
26	N/A
-	-
270	21 (51)
-	-

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 2

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	37	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	30	35	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	0			-
'01	0			-

Artemisia tridentata vaseyana																		
S	84	47	-	-	-	-	-	-	-	-	47	-	-	-	3133			47
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	14	-	-	-	-	-	-	-	-	14	-	-	-	933			14
	96	16	-	-	-	-	-	-	-	-	15	-	1	-	320			16
	01	13	-	-	1	-	-	-	-	-	14	-	-	-	280			14
M	84	-	3	18	-	-	-	-	-	-	21	-	-	-	1400	33	36	21
	90	12	1	-	-	-	-	-	-	-	11	1	1	-	866	35	36	13
	96	40	24	-	-	-	-	-	-	-	64	-	-	-	1280	27	49	64
	01	23	26	5	-	-	-	-	-	-	52	2	-	-	1080	27	44	54
D	84	-	1	3	-	-	-	-	-	-	3	-	1	-	266			4
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	7	6	-	-	-	-	-	-	-	10	-	1	2	260			13
	01	9	13	2	-	-	-	-	-	-	21	-	-	3	480			24
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	420			21

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	19%	81%	04%	+19%
'90	03%	00%	03%	-13%
'96	32%	00%	04%	- 1%
'01	42%	08%	03%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	1732	Dec:	15%
'90	2132		16%
'96	1860		14%
'01	1840		26%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320			16
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	20	-	-	1	-	-	-	-	-	21	-	-	-	420	11	15	21
	01	34	-	-	-	-	-	-	-	-	34	-	-	-	680	11	17	34
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	3	-	-	-	-	-	-	-	-	1	-	-	2	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+ 0%
'01	00%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'84	0	Dec:		0%
	'90	0			0%
	'96	740			0%
	'01	740			8%

Prunus virginiana																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20	13	0
	01	2	-	-	4	-	-	-	-	-	6	-	-	-	120	-	-	6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+50%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'84	0	Dec:		-
	'90	0			-
	'96	60			-
	'01	120			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	75	98	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	100%	00%	+ 0%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		0%
'90	0			0%
'96	20			0%
'01	20			100%

Trend Study 3-3-01

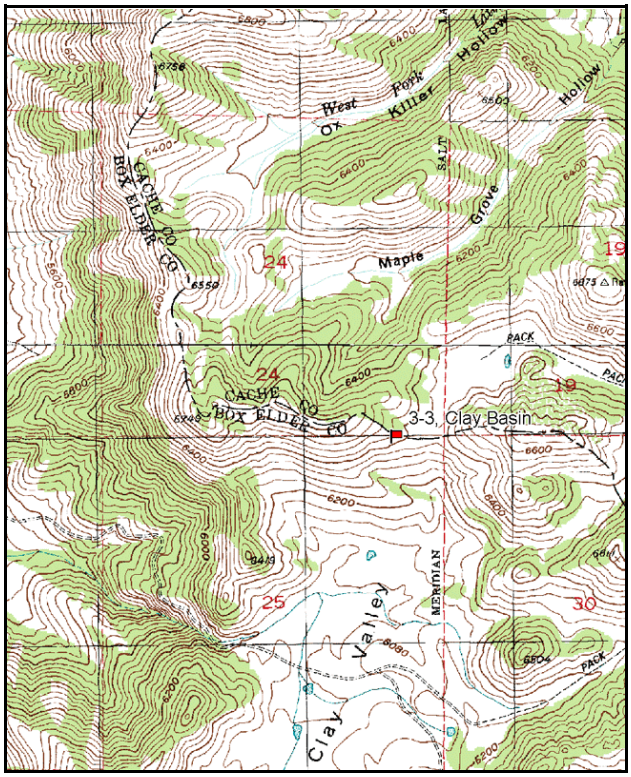
Study site name: Clay Basin . Vegetation type: Big Sagebrush-Grass .

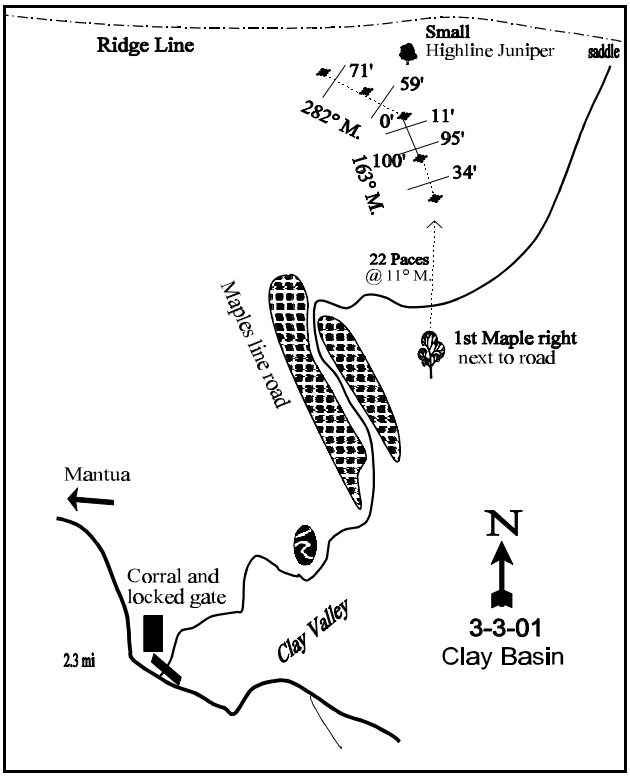
Compass bearing: frequency baseline 163 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Mantua Hatchery, proceed 0.65 mile (towards Mantua) to first possible right turn. Turn right and proceed 2.3 miles up the canyon to Clay Valley and stop at a locked gate on the east end of the corral. Cross the gate and begin walking down the road in a northern direction. You will pass a stock pond on the left side of the road. After approximately 0.75 miles, the road will pass through a dense stand of maples. Hook sharply to the right and break out of the maples. Proceed 54 paces past switchback to first lone maple on right side of the road. From the maple, walk approximately 22 paces on a bearing of 11 degrees magnetic to the 200-foot stake of the baseline. The 0-foot baseline stake is 200 feet at a bearing of 343 degrees magnetic and is marked by browse tag #7997. The first 200 feet of the baseline run 163 degrees magnetic. The second 200 feet run off the 0-foot baseline stake at a bearing of 282 degrees magnetic.





Map Name: Mantua

Diagrammatic Sketch

Township 9N , Range 1W , Section 25

UTM 4593957 N 425426 E

DISCUSSION

Trend Study No. 3-3

The Clay Basin study is east of Mantua in Clay Valley. Situated at a relatively high elevation (6,320 feet), the site is on a 30%, south-facing slope occupied by a mountain big sagebrush-grass community. Although within the limits of deer winter range, there were few signs of any significant deer use from 1984-1996. Currently, there appears to be moderate use by deer and light use by elk. Pellet group transect data taken in 2001 estimated 61 deer days use/acre (150 ddu/ha) and 3 elk days use/acre (8 edu/ha). Spring and summer sheep grazing was obvious during the 1984 reading, but was light in 1996 and 2001. Cattle were using the area during the 1996 reading. Use was considered light on site, with heavy use being observed in the bottoms near water. Livestock use on site was estimated at 2 cow days use/acre (5 cdu/ha) in 2001.

Soil at the study site is "Yeates Hollow Stony Loam", a well-drained, moderately deep soil derived from sandstone and quartzite. It is rocky or cobbly on the surface, and usually dries completely in the upper 4 to 12 inches after 60 to 90 consecutive days in summer (Chadwick et al. 1975). Although this soil type has a moderate erosion hazard, the current erosion condition classification (‘01) determined soils to be stable. Protective cover provided by vegetation and litter prevent all but minor erosion. Soils at the site have a clay loam texture and a soil reaction that is slightly acidic (pH of 6.3). Effective rooting depth (see methods) was estimated at just over 12 inches. Gravel is abundant throughout the profile. Bare ground is rare and usually associated with cattle trails. Organic matter is relatively high at over 5%.

The key browse species is a vigorous stand of mountain big sagebrush which provides over 90% of the browse cover. Other shrubs such as mountain snowberry and stickyleaf low rabbitbrush are sparsely distributed throughout the area. The mountain big sagebrush population is stable with mostly light to occasionally moderate hedging. Density is estimated at 2,620, mostly mature, plants/acre in 2001. Recruitment from young plants declined from 23% in 1996 to 2% in 2001. This decline is most likely due to the extended drought as well as competition with the abundant herbaceous understory. Decadence was moderately high in 1990 at 42%, but has since declined to 18% in 1996 and 2001. Vigor is normal on all except a few decadent shrubs. Annual leader growth was relatively low at just over 2 inches in 2001, but seed production was abundant.

Perennial grasses show exceptionally vigorous growth and consist of a wide variety of species. Among the most frequently occurring are bluebunch wheatgrass, bulbous bluegrass, Sandberg bluegrass and Kentucky bluegrass. Bulbous bluegrass has significantly increased in nested frequency every year since the site was established in 1984. Bluebunch wheatgrass is currently (‘01) second in abundance to bulbous bluegrass. In 1996, Japanese brome was extremely abundant providing 33% of the grass cover and 21% of total vegetative cover at the site. Due to drought conditions in 2000 and 2001, this species dramatically declined between 1996 and 2001. It currently (‘01) provides only 2% of the grass cover. Slightly lower on the slope are significant amounts of slender wheatgrass, mountain brome, smooth brome, subalpine needlegrass, crested wheatgrass and Great Basin wildrye. Grasses show evidence of light to negligible grazing use.

Forbs are diverse yet have not been particularly abundant. Weedy forb species include western yarrow, thistle, willowweed, dyers woad, prickly lettuce, sunflower, tarweed and yellow salsify which accounted for the majority of the forb cover in 1996. Silvery lupine is currently the most abundant forb due to a dramatic increase in 2001. Many of the more palatable forb species had been moderately grazed by sheep during the 1984 reading.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Erosion is slight due to a good vegetative cover on a gentle to moderate slope. Vegetative trend also seems stable, at least temporarily. However, there is a potential for change. Grass density may be thickening at the expense of desirable forbs, perhaps in response to the grazing habits of sheep. Such a trend could also inhibit sagebrush reproduction. Another possibility is an increase of undesirable weeds and annuals. These are common on the study area and could easily become more so.

1990 TREND ASSESSMENT

This privately owned sagebrush/grass range in Clay basin has recently been grazed by cattle and receives moderate winter deer use. Mountain big sagebrush has remained stable and vigorous since 1984. Seedling and young sagebrush commonly occur in limited areas, but were not sampled by the density plots. The majority of the sagebrush have a light or moderately hedged growth form. Trend for herbaceous species is slightly up with significant increases in the nested frequency of the desirable perennial grasses, bluebunch wheatgrass and Sandberg bluegrass. One negative aspect is the increase in dyer's woad which should be closely monitored in the future. Cheatgrass remains a commonly occurring undesirable. Under the current management and grazing by cattle instead of sheep, the trends for winter range values appear stable.

TREND ASSESSMENT
soil - stable (3)
browse - stable, with sagebrush slightly increasing (3)
herbaceous understory - slightly up (4)

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground (12% to 2%). Litter cover increased while rock and pavement cover declined from 13% to 4%. Trend for mountain big sagebrush is stable. Population density declined somewhat, but much of the decline is due to the much larger sample used in 1996 which gives a much better estimate of sagebrush densities. Dead plants are fairly rare (220 plants/acre or 7%), indicative of a stable population. Utilization is mostly light, decadence has declined from 42% to 18%, and recruitment is high at 23%. Trend for the herbaceous understory is slightly down. The herbaceous understory is dominated by bulbous bluegrass and Japanese brome. Nested frequency for bluebunch wheatgrass has increased significantly since 1990, but nested frequency for Kentucky bluegrass and Sandberg bluegrass have declined. Sum of nested frequency for perennial forbs significantly decreased, while that of annual forbs significantly increased. However, forbs are a minor component as they contribute to only 6% of the total vegetation cover at the site.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Although bare ground slightly increased, vegetation and litter cover are adequate to prevent serious erosion. An erosion condition classification determined soils to be stable at the present time. Trend for browse is stable. The key species, mountain big sagebrush, remains at a nearly stable density. Percent recruitment declined from 23% to 2%, but percent decadence is unchanged since 1996. Vigor is good in the majority of the population as use remains light to moderate. Trend for the herbaceous understory is

slightly up. Sum of nested frequency for perennial grasses and forbs increased in 2001. Although much of this increase is due to the increase in bulbous bluegrass, a low value perennial, Japanese brome dramatically decreased in nested and quadrat frequencies in 2001.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 3

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	a28	b87	c156	c176	10	31	68	65	8.15	11.82
G	Agropyron trachycaulum	2	2	-	1	1	1	-	1	-	.00
G	Bromus japonicus (a)	-	-	b293	a64	-	-	87	30	12.51	.86
G	Bromus marginatus	-	3	-	-	-	1	-	-	-	-
G	Bromus tectorum (a)	-	-	25	29	-	-	9	10	.31	.64
G	Koeleria cristata	1	-	-	-	1	-	-	-	-	-
G	Melica bulbosa	44	36	15	28	19	21	9	12	.22	.17
G	Poa bulbosa	a18	b63	c213	d307	6	26	68	91	12.98	19.38
G	Poa pratensis	ab79	b97	a44	b86	30	41	20	33	1.30	3.42
G	Poa secunda	a20	b129	b87	a41	8	49	33	20	2.44	.68
G	Stipa columbiana	-	-	-	3	-	-	-	1	-	.15
Total for Annual Grasses		0	0	318	93	0	0	96	40	12.83	1.50
Total for Perennial Grasses		192	417	515	642	75	170	198	223	25.12	35.64
Total for Grasses		192	417	833	735	75	170	294	263	37.95	37.15
F	Achillea millefolium	b99	b87	a51	ab51	39	34	25	27	.89	1.21
F	Agoseris glauca	b50	b37	a10	abb32	20	18	5	17	.02	.26
F	Allium acuminatum	c44	b14	a-	ab3	20	8	-	1	-	.03
F	Alyssum alyssoides (a)	-	-	25	11	-	-	11	7	.05	.06
F	Arabis spp.	-	-	-	-	-	-	-	-	-	.00
F	Aster spp.	1	-	-	-	1	-	-	-	-	-
F	Astragalus spp.	b20	b28	a-	a-	12	10	-	-	-	-
F	Camelina microcarpa (a)	-	-	3	-	-	-	1	-	.00	-
F	Calochortus nuttallii	5	6	-	-	2	5	-	-	-	-
F	Cirsium undulatum	a3	b23	ab16	ab11	3	12	7	6	.77	.30
F	Collomia linearis (a)	-	-	b28	a1	-	-	16	1	.08	.00
F	Collinsia parviflora (a)	-	-	a1	b9	-	-	1	3	.00	.01
F	Crepis acuminata	3	-	1	-	1	-	1	-	.00	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Cryptantha spp.	-	-	3	3	-	-	2	1	.03	.00
F	Draba spp. (a)	-	-	1	10	-	-	1	5	.00	.02
F	Epilobium brachycarpum (a)	-	-	$_{b}$39	$_{a}$3	-	-	16	2	.35	.01
F	Eriogonum brevicaule	-	-	-	3	-	-	-	1	-	.03
F	Erodium cicutarium (a)	-	-	-	5	-	-	-	2	-	.06
F	Galium aparine (a)	-	-	$_{b}$11	$_{a}$-	-	-	5	-	.10	-
F	Geranium spp.	3	-	3	-	1	-	1	-	.01	-
F	Gilia spp. (a)	-	-	-	1	-	-	-	1	-	.00
F	Grindelia squarrosa	-	2	-	4	-	1	-	2	-	.53
F	Helianthus annuus (a)	-	5	13	3	-	3	5	1	.10	.00
F	Holosteum umbellatum (a)	-	-	41	35	-	-	16	18	.22	.15
F	Isatis tinctoria	$_{a}$9	$_{b}$109	$_{a}$6	$_{a}$5	5	47	4	2	.04	.03
F	Lappula occidentalis (a)	-	-	1	1	-	-	1	1	.00	.00
F	Lactuca serriola	$_{a}$-	$_{b}$75	$_{a}$1	$_{a}$3	-	32	1	1	.00	.00
F	Lupinus argenteus	$_{a}$23	$_{a}$33	$_{a}$21	$_{b}$118	13	16	11	55	.47	7.05
F	Madia glomerata (a)	-	$_{ab}$11	$_{b}$19	$_{a}$3	-	5	8	1	.21	.00
F	Microsteris gracilis (a)	9	-	6	-	4	-	2	-	.03	-
F	Phlox longifolia	-	2	-	-	-	1	-	-	-	-
F	Polygonum douglasii (a)	-	-	35	-	-	-	20	-	.10	-
F	Senecio multilobatus	$_{b}$53	$_{a}$7	$_{a}$-	$_{a}$8	26	2	-	4	-	.02
F	Taraxacum officinale	$_{a}$3	$_{b}$13	$_{a}$1	$_{a}$-	1	6	1	-	.00	-
F	Tragopogon dubius	$_{a}$11	$_{c}$117	$_{a}$13	$_{b}$63	7	53	6	34	.08	1.63
F	Unknown forb-perennial	$_{a}$-	$_{b}$25	$_{a}$-	$_{a}$-	-	14	-	-	-	-
F	Viola spp.	$_{a}$-	$_{b}$19	$_{a}$-	$_{a}$-	-	12	-	-	-	-
Total for Annual Forbs		9	16	223	82	4	8	103	42	1.28	0.34
Total for Perennial Forbs		327	597	126	304	151	271	64	151	2.34	11.13
Total for Forbs		336	613	349	386	155	279	167	193	3.62	11.48

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 3

Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Acer grandidentatum	1	1	.03	.15
B	Artemisia tridentata vaseyana	78	73	16.62	23.46
B	Chrysothamnus nauseosus albicaulis	2	2	.03	-
B	Chrysothamnus viscidiflorus viscidiflorus	2	3	.03	.00
B	Gutierrezia sarothrae	1	0	-	-
B	Juniperus osteosperma	1	1	.53	.03
B	Symphoricarpos oreophilus	6	9	.21	1.50
Total for Browse		91	89	17.45	25.14

CANOPY COVER --
Herd unit 03 , Study no: 3

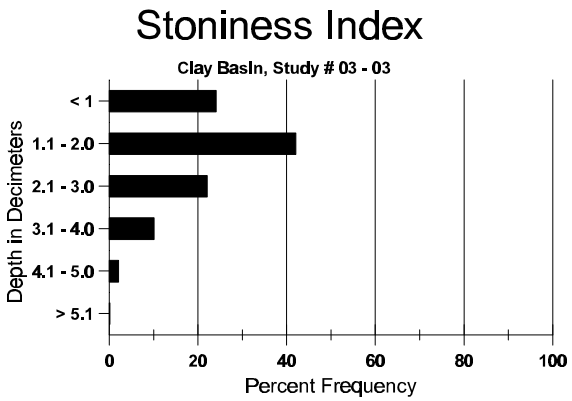
Species	Percent Cover '01
Acer grandidentatum	.60
Juniperus osteosperma	1

BASIC COVER --
Herd unit 03 , Study no: 3

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '84	Average Cover % '90	Average Cover % '96	Average Cover % '01
Vegetation	383	371	3.00	14.25	58.50	67.65
Rock	50	25	3.75	1.75	.58	.28
Pavement	154	136	3.50	10.75	3.86	1.87
Litter	398	391	76.25	61.50	66.88	55.39
Cryptogams	9	24	.50	0	.07	.15
Bare Ground	88	130	13.00	11.75	2.17	5.49

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 03, Clay Basin

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.3	61.0 (13.4)	6.3	28.7	42.0	29.3	5.3	29.3	240.0	.5



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 3

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Sheep	1	-	-	-
Elk	3	-	44	3 (8)
Deer	7	22	792	61 (150)
Cattle	4	1	26	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 3

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Acer grandidentatum																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22	29	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+ 0%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	20		-
	'01	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	33	-	-	-	-	-	-	-	-	33	-	-	-	660			33
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	25	16	5	-	-	-	-	-	-	46	-	-	-	3066	29	43	46
	90	22	3	-	8	-	-	-	-	-	33	-	-	-	2200	39	38	33
	96	79	7	-	-	-	-	-	-	-	86	-	-	-	1720	22	41	86
	01	93	13	-	-	-	-	-	-	-	100	5	1	-	2120	27	42	106
D	84	2	2	2	-	-	-	-	-	-	4	-	2	-	400			6
	90	16	4	1	3	-	-	-	-	-	20	2	2	-	1600			24
	96	22	3	-	1	-	-	-	-	-	23	-	-	3	520			26
	01	13	10	-	-	-	-	-	-	-	16	2	-	5	460			23
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	380			19

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	34%	13%	04%	+ 7%
'90	12%	02%	04%	-24%
'96	07%	00%	02%	-10%
'01	18%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	3532	Dec:		11%
'90	3800			42%
'96	2900			18%
'01	2620			18%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus albicaulis																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	32	60	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	29	41	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+ 0%
'01	00%	00%	50%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		0%
'90	0			0%
'96	40			50%
'01	40			50%

Chrysothamnus viscidiflorus viscidiflorus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	24	1
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60	15	24	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	01	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	50%	+50%
'01	00%	00%	25%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		0%
'90	0			0%
'96	40			50%
'01	80			25%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	20	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	118	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	20		-
	'01	0		-

Juniperus osteosperma																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1
	01	-	-	-	-	-	-	-	1	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+ 0%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	20		-
	'01	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	4	-	-	-	-	-	4	-	-	-	80	22	47	4
	01	8	3	-	1	-	-	-	-	-	12	-	-	-	240	61	48	12
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	1	1	-	-	-	1	-	-	2	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	14%	14%	29%	+42%
'01	25%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		0%
'90	0			0%
'96	140			43%
'01	240			0%

Trend Study 3-4-01

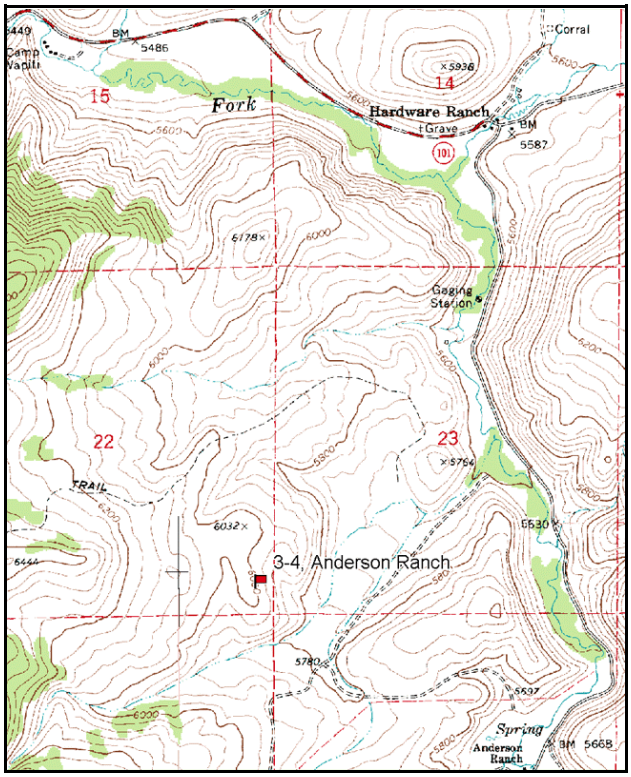
Study site name: Anderson Ranch . Vegetation type: Sagebrush-Bitterbrush .

Compass bearing: frequency baseline 168 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

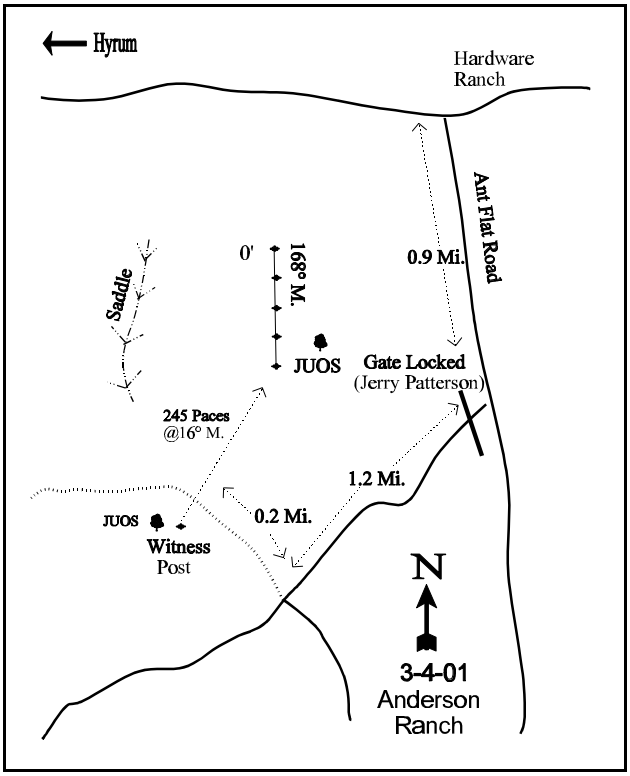
LOCATION DESCRIPTION

From Hardware Ranch, travel south on the Ant Flat Road for 0.9 miles. Turn right and go through a locked gate. Cross the Blacksmith Fork River and then proceed up the canyon 1.2 miles to a fork. Turn right (west) and travel 0.2 mile to the witness post by the road on the left side. From the witness post, walk 245 paces at 16 degrees magnetic to the 400-foot stake of the baseline. The 0-foot baseline stake is 400 feet to the north at a bearing of 348 degrees magnetic. The 0-foot stake is marked by browse tag #7932. Baseline bearing is 168 degrees magnetic.



Map Name: Hardware Ranch

Township 10N , Range 3E , Section 22



Diagrammatic Sketch

UTM 4603382 N 451731 E

DISCUSSION

Trend Study No. 3-4

The Anderson Ranch trend study is located on normal deer and elk winter range in upper Blacksmith Fork Canyon. Elevation is approximately 6,000 feet on a nearly level ridge. The prevailing plant community is mountain big sagebrush/grass with a good association of antelope bitterbrush. Mule deer use of the site was moderate in 1996 and heavy in 2001. Pellet group transect data taken in 2001 estimated 140 deer days use/acre (346 ddu/ha). Elk use was lighter at an estimated 32 elk days use/acre (79 edu/ha). Domestic sheep and cattle also utilize the area, but use in 1996 and 2001 was light.

Soil is classed as "Ant Flat Loam", a well drained series derived from sandstone and shale. This soil has a porous surface horizon about 7 inches thick. Below this depth, the subsoil is increasingly clay in texture and has concentrations of leached calcium carbonate at about 60 inches. Plant root penetration is not a problem until the calcareous zone is reached. Although the erosion hazard is moderate for this soil type (Erickson and Mortensen, 1974), the current (‘01) erosion condition classification shows soils to be stable with minimal erosion occurring. Soils at the site have a clay loam texture and a neutral soil reaction (pH of 7.0). It is extremely rocky and compacted. Effective rooting depth (see methods) was estimated at over 11 inches in 1996.

The key species are bitterbrush and mountain big sagebrush which together provide 74% of the browse cover. The estimated density of bitterbrush decreased in 1996 and 2001 compared to previous readings. The difference in density is attributed to the much larger sample used beginning in 1996, which tripled the original sample size and better estimates shrub populations which often have clumped and/or discontinuous distributions. Percent decadency in the bitterbrush population was very high in 1984 at 92%, decreasing to 67% in 1990. Currently, decadency is low at 6%. Recruitment of young plants increased from 6% in 1996 to 12% in 2001. Use on bitterbrush has been moderate to heavy in all sampling years. Vigor is good in the majority of the population with bitterbrush annual leader growth averaging just over 4 inches in 2001.

Mountain big sagebrush was also heavily utilized in 1984 with all plants sampled displaying a heavily hedged growth form. Use has since stabilized at a more moderate level. Decadent plants made up 67% of the population in 1984, decreasing to around 20% in 1990 and 2001. No decadent plants were sampled in 1996. The increase in decadent plants since 1996 is due most likely to the extended drought of the past few years. This should improve with the return of more normal precipitation patterns. During the 1996 and 2001 readings, the density of sagebrush was similar to 1984 estimates (400 plants/acre). Utilization was light to moderate and no decadent plants were found. However, dead plants, first sampled in 1996, numbered more than live ones (460 plants/acre) indicating a past die-off. Most likely this die-off was associated with the several years of continuous drought from about 1987 to 1990 (Utah climate summaries 2001). Recruitment of young plants has been moderate from 1990-2001, currently (‘01) at 14%. However, the number of dead plants was higher than the number of young in both 1996 and 2001. Annual leader growth averaged just over 2 inches in 2001.

The most numerous shrub on the site is stickyleaf low rabbitbrush. It provided 26% of the browse cover in 2001 and had an estimated density of 2,380 plants/acre. This species appears to be stable as 85% of the population consisted of mature plants. Plants are not utilized and vigor is normal. Decadency increased from 2% in 1996 to 13% in 2001.

Understory composition and density are dominated by perennial grasses, most notably bluebunch wheatgrass and Sandberg bluegrass. Annual grasses, first included in 1996, were also abundant with Japanese brome and cheatgrass producing 29% of the grass cover in 1996. Due to drought conditions of the past 2 years, these 2

species have decreased to only 7% of the grass cover. Bulbous bluegrass, a low value perennial, has increased significantly in nested frequency between 1996 and 2001. Considering elevation and annual precipitation, the forb composition is not very abundant and its composition is poor. A long history of sheep grazing has possibly given grasses a competitive advantage. The most common forb in 1996 was western yarrow, which is reputedly unpalatable to livestock but is used by deer and elk. Storksbill provides the most cover of any forb species in 2001. Most forbs are occasional in their occurrence and provide relatively little forage.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable because of a moderately dense cover of perennial grasses that is effective in preventing runoff and erosion. Vegetative trend may be declining because of unfavorable age structures in populations of the key browse species and an apparent increase in density and cover of grass and stickyleaf low rabbitbrush.

1990 TREND ASSESSMENT

Contrary to the downward trends predicted in 1984, the browse component on this site has not experienced a significant decline. In fact, mountain big sagebrush and bitterbrush have increased while percent decadency has decreased. The sagebrush and bitterbrush have a more balanced age class structures now. Low rabbitbrush remains a prominent factor in the understory as it has increased also. There is still a high percentage of decadence in the bitterbrush population. The sagebrush and bitterbrush have a heavily hedged growth form, as some forage production is unavailable. The healthy understory of grasses and forbs has stayed about the same. The understory provides adequate vegetative and litter ground cover.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - slightly improving (4)

1996 TREND ASSESSMENT

The soil trend is up with a considerable decline in bare ground cover (22% down to 11%). Litter cover remained similar to 1990 estimates, while cryptogamic cover nearly doubled. Vegetation and litter cover are abundant and well dispersed and effectively limit erosion. The browse trend appears stable. Bitterbrush density declined from 999 plants/acre in 1990 to 320 by 1996. However, the lack of a high number of dead plants (only 100 plants/acre) would indicate that most of the change in density is due to the much larger sample size giving a more accurate population estimate. Utilization is moderate to heavy, vigor normal, with no decadent plants encountered. The mountain big sagebrush population has declined 60% since 1990. The large number of dead plants (460 plants/acre) would suggest that this change is less related to sample size, and more closely associated with many years of extended drought (1987 to 1990). Stickyleaf low rabbitbrush is currently the most abundant shrub. It appears to have a stable population. The herbaceous understory is dominated by grasses. Sum of nested frequency for perennial grasses has declined since 1990. Bluebunch wheatgrass has maintained a stable nested frequency. However, Prairie junegrass and Sandberg bluegrass have declined. Annual grasses are also common but were not included in the previous samples so no comparisons can be made. The forb component is still poor, as it makes up only 7% of the herbaceous cover. Sum of nested frequency for perennial forbs has declined 53% in nested frequency since 1990. Overall, trend is considered slightly down.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - slightly down (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Protective cover from vegetation and litter remain at 1996 levels. Trend for the key browse species is stable. Densities for bitterbrush and mountain big sagebrush remain stable. Percent decadency increased for both species in 2001 due to the drought conditions of the past 2 years. Although these increases are small and vigor remains good. The herbaceous understory has a slightly upward trend. Sum of nested frequency for perennial grasses slightly increased, with the most abundant species, bluebunch wheatgrass, remaining stable. Sandberg bluegrass and bulbous bluegrass both significantly increased in nested frequency. Another positive aspect is the significant decrease in annual brome grasses on the site due to drought.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 4

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	271	276	267	237	90	91	88	77	12.89	12.87
G	Bromus japonicus (a)	-	-	$_{b}$186	$_{a}$81	-	-	61	37	5.14	.85
G	Bromus tectorum (a)	-	-	$_{b}$114	$_{a}$46	-	-	40	17	2.62	.73
G	Elymus cinereus	-	-	2	3	-	-	1	1	.53	.85
G	Hordeum jubatum	4	5	-	-	2	3	-	-	-	-
G	Koeleria cristata	52	53	28	32	21	20	13	16	.79	.55
G	Poa bulbosa	$_{a}$-	$_{a}$-	$_{b}$52	$_{c}$85	-	-	23	30	1.55	2.82
G	Poa pratensis	-	-	-	4	-	-	-	3	-	.04
G	Poa secunda	$_{ab}$202	$_{c}$267	$_{a}$160	$_{bc}$213	81	90	63	70	3.42	4.59
G	Stipa comata	-	-	-	1	-	-	-	1	-	.00
Total for Annual Grasses		0	0	300	127	0	0	101	54	7.76	1.59
Total for Perennial Grasses		529	601	509	575	194	204	188	198	19.20	21.74
Total for Grasses		529	601	809	702	194	204	289	252	26.96	23.33
F	Achillea millefolium	$_{b}$191	$_{a}$84	$_{a}$49	$_{a}$55	73	40	21	24	.60	.42
F	Agoseris glauca	$_{a}$-	$_{b}$126	$_{a}$1	$_{a}$2	-	59	1	1	.00	.00
F	Allium acuminatum	$_{b}$23	$_{a}$4	$_{a}$-	$_{a}$1	10	2	-	1	-	.00
F	Alyssum alyssoides (a)	-	-	$_{b}$114	$_{a}$67	-	-	45	31	.32	.18

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Antennaria rosea	-	-	-	2	-	-	-	1	-	.03
F	Arabis drummondi	$_{a}$-	$_{ab}$1	$_{b}$9	$_{a}$-	-	1	5	-	.02	-
F	Aster chilensis	-	1	3	3	-	1	1	1	.00	.03
F	Astragalus convallarius	$_{a}$-	$_{b}$17	$_{b}$10	$_{ab}$2	-	11	5	1	.05	.03
F	Calochortus nuttallii	3	-	-	1	2	-	-	1	-	.00
F	Cirsium undulatum	12	12	14	7	6	6	6	5	.39	.24
F	Collomia linearis (a)	-	-	9	4	-	-	5	3	.02	.01
F	Collinsia parviflora (a)	-	-	60	58	-	-	24	27	.11	.16
F	Crepis acuminata	$_{a}$-	$_{b}$10	$_{a}$-	$_{a}$-	-	6	-	-	-	-
F	Cryptantha spp.	-	6	-	-	-	3	-	-	-	-
F	Descurainia pinnata (a)	-	-	3	-	-	-	1	-	.00	-
F	Draba spp. (a)	-	-	-	3	-	-	-	1	-	.00
F	Epilobium brachycarpum (a)	-	-	13	19	-	-	6	8	.03	.16
F	Eriogonum cernuum (a)	-	-	1	-	-	-	1	-	.00	-
F	Erodium cicutarium (a)	-	-	$_{a}$7	$_{b}$50	-	-	4	20	.07	1.65
F	Erigeron spp.	-	-	-	3	-	-	-	2	-	.06
F	Eriogonum umbellatum	-	3	1	2	-	2	1	1	.03	.00
F	Holosteum umbellatum (a)	-	-	$_{b}$76	$_{a}$29	-	-	31	14	.28	.44
F	Lappula occidentalis (a)	-	-	2	11	-	-	1	5	.00	.03
F	Lactuca serriola	-	-	-	3	-	-	-	2	-	.01
F	Lithospermum ruderale	$_{a}$-	$_{a}$-	$_{b}$10	$_{a}$-	-	-	5	-	.24	-
F	Lupinus argenteus	9	7	8	3	4	2	6	2	.06	.04
F	Microsteris gracilis (a)	-	-	$_{b}$44	$_{a}$4	-	-	17	2	.08	.01
F	Orthocarpus tolmiei (a)	-	-	$_{b}$19	$_{a}$-	-	-	10	-	.30	.03
F	Phlox longifolia	-	5	-	-	-	2	-	-	-	-
F	Polygonum douglasii (a)	-	-	$_{b}$32	$_{a}$5	-	-	14	3	.07	.01
F	Ranunculus testiculatus (a)	-	-	9	-	-	-	3	-	.01	-
F	Taraxacum officinale	-	9	-	-	-	3	-	-	-	-
F	Tragopogon dubius	$_{ab}$21	$_{a}$3	$_{a}$9	$_{b}$33	10	1	5	18	.05	.34
F	Trifolium gymnocarpon	-	-	4	-	-	-	2	-	.01	-
F	Unknown forb-perennial	-	2	-	-	-	1	-	-	-	-
F	Veronica biloba (a)	-	-	1	-	-	-	1	-	.00	-
F	Zigadenus paniculatus	-	3	-	-	-	1	-	-	-	-
Total for Annual Forbs		0	0	390	250	0	0	163	114	1.34	2.71
Total for Perennial Forbs		259	293	118	117	105	141	58	60	1.47	1.24
Total for Forbs		259	293	508	367	105	141	221	174	2.81	3.95

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 4

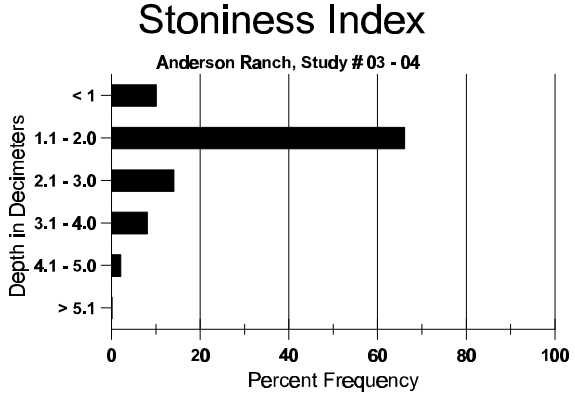
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Artemisia tridentata vaseyana	19	15	3.47	5.05
B	Chrysothamnus viscidiflorus viscidiflorus	66	57	4.69	3.65
B	Eriogonum heracleoides	0	1	-	-
B	Gutierrezia sarothrae	9	1	.24	-
B	Purshia tridentata	15	16	4.09	5.25
B	Tetradymia canescens	2	4	-	-
Total for Browse		111	94	12.50	13.97

BASIC COVER --
Herd unit 03 , Study no: 4

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '84	Average Cover % '90	Average Cover % '96	Average Cover % '01
Vegetation	383	364	6.25	19.75	43.24	47.43
Rock	102	30	1.00	.75	.86	.36
Pavement	140	130	1.25	0	.95	.93
Litter	399	385	70.75	50.75	51.29	52.27
Cryptogams	219	150	5.50	7.00	12.98	6.75
Bare Ground	179	183	15.25	21.75	10.92	14.55

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 04, Anderson Ranch

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.5	57.4 (15.1)	7.0	42.7	24.0	33.3	3.7	14.3	115.2	.6



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 4

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Sheep	4	3	261	N/A
Rabbit	5	8	52	N/A
Grouse	-	1	-	-
Elk	23	10	418	32 (79)
Deer	38	53	1818	140 (346)
Cattle	2	-	-	-

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 4

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	2	-	-	4	-	-	-	266			4
	96	4	1	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	2	1	-	-	-	-	-	-	-	3	-	-	-	60			3
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	133	28	35	2
	90	4	2	-	2	-	-	-	-	-	8	-	-	-	533	28	31	8
	96	3	12	-	-	-	-	-	-	-	15	-	-	-	300	35	50	15
	01	11	3	-	-	-	-	-	-	-	14	-	-	-	280	33	50	14
D	84	-	-	4	-	-	-	-	-	-	4	-	-	-	266			4
	90	2	1	-	-	-	-	-	-	-	3	-	-	-	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	2	2	-	-	-	-	-	-	-	4	-	-	-	80			4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	460			23
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	00%	+60%
'90	20%	00%	00%	-60%
'96	65%	00%	00%	+ 5%
'01	29%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	399	Dec:	67%
	'90	999		20%
	'96	400		0%
	'01	420		19%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	90	9	-	-	1	-	-	-	-	-	10	-	-	-	666			10
	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80			4
	01	2	1	-	-	-	-	-	-	-	3	-	-	-	60			3
M	84	30	-	-	-	-	-	-	-	-	30	-	-	-	2000	12	13	30
	90	27	1	-	9	1	-	1	-	-	39	-	-	-	2600	13	17	39
	96	136	11	-	2	-	-	-	-	-	149	-	-	-	2980	15	23	149
	01	91	1	-	9	-	-	-	-	-	101	-	-	-	2020	12	20	101
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	1	-	-	-	-	-	-	-	1	-	-	1	133			2
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	14	-	-	1	-	-	-	-	-	14	-	-	1	300			15
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+27%
'90	06%	00%	02%	- 8%
'96	08%	00%	00%	-24%
'01	02%	00%	.84%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	2466	Dec:		0%
'90	3399			4%
'96	3120			2%
'01	2380			13%

Eriogonum heracleoides																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	10	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	-
'90	0		-
'96	0		-
'01	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	21	-	-	-	-	-	-	-	-	21	-	-	-	420	7	9	21
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	5	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	-95%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	440			-
'01	20			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus scopulorum																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	1	-	1	-	-	-	66	134	81	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	66			-
'96	0			-
'01	0			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	1	-	-	1	-	-	3	-	-	-	200			3
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	1	-	-	-	1	-	-	-	-	2	-	-	-	40			2
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	32	37	1
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133	15	26	2
	96	4	7	4	-	-	-	-	-	-	15	-	-	-	300	29	55	15
	01	5	-	6	-	1	2	-	-	-	14	-	-	-	280	36	62	14
D	84	-	-	8	-	1	3	-	-	-	11	-	1	-	800			12
	90	-	-	-	1	4	-	-	-	5	8	-	-	2	666			10
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	1	-	-	-	-	-	-	1	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	08%	92%	08%	+13%
'90	33%	33%	13%	-68%
'96	44%	25%	00%	+ 6%
'01	12%	53%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	866	Dec:	92%
	'90	999		67%
	'96	320		0%
	'01	340		6%

Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	16	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	28	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40	18	33	2
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	17	33	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+50%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	40		-
	'01	80		-

*****Suspended*****

Trend Study 3-5-96

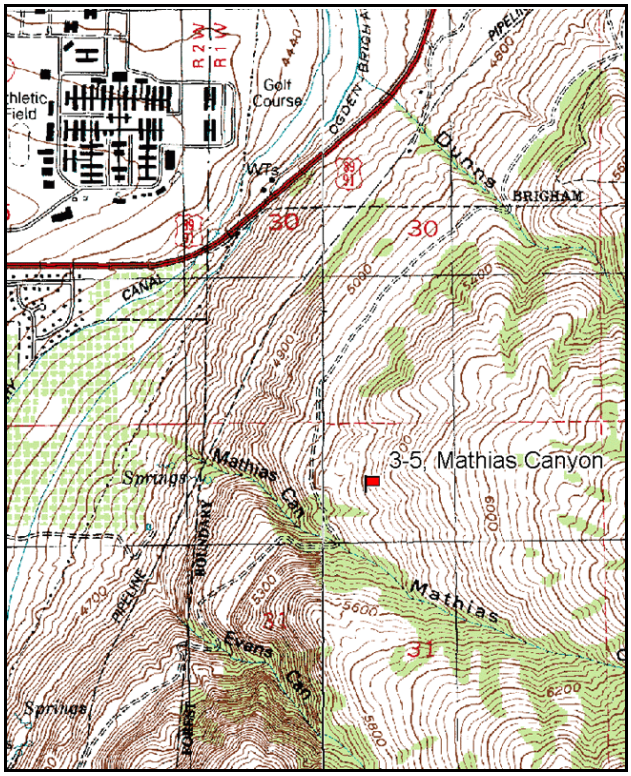
Study site name: Mathias Canyon . Vegetation type: Smooth Sumac .

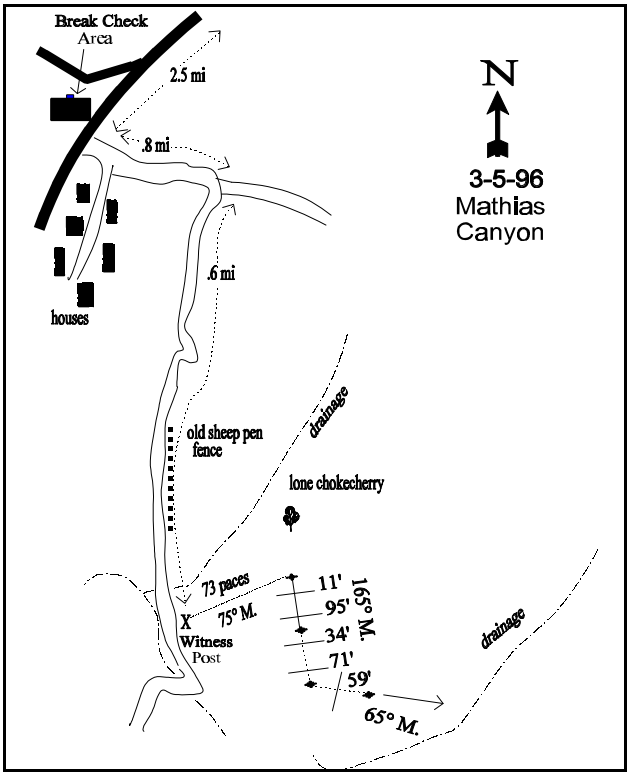
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft).

LOCATION DESCRIPTION

From Mantua Hatchery, proceed to Box Elder Canyon road (west bound), turn left toward Brigham City, and travel 2.5 miles to a point where a dirt road takes off to the left. A truck brake test area is just opposite and slightly north of this point. Turn left, take left fork up a dugway to DWR property and proceed 0.7 miles toward bench and mouth of Box Elder Canyon. After 0.7 mile you will come to a sharp hairpin turn to the right. Turn right here and travel 0.6 miles up onto bench and stop just before Mathias Creek passes under the road. Just before this the creek will pass across the face of an old sheep pen. Approximately 40 feet north of where the creek crosses the road there is a witness post on the east side of the road. From the witness post to the 0-foot baseline stake walk 70 paces at a bearing of 75 degrees magnetic. The 0-foot baseline stake is marked with browse tag #7996. The baseline runs 165 degrees magnetic.





Map Name: Mantua

Diagrammatic Sketch

Township 9N , Range 1W , Section 31

UTM 4592180 N 416650 E

DISCUSSION

Trend Study No. 3-5

***SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. In 2001, this site was evaluated by the Project Leader and it was determined that there was no wildlife use and very little important browse on the site. This was the case in 1996 when the study was sampled last. Text and data tables are included from the 1996 report.

The Mathias Canyon study samples a very steep (65%), west facing slope that is located above the upper Lake Bonneville terrace on the north side of Mathias Canyon. Elevation is approximately 5,280 feet. Thought to be important as severe winter range in the past, the study site is characterized by an extremely rocky soil surface and a badly depleted vegetative composition. Heavy deer use in 1984 was confirmed by pellet group frequency and the level of browsing on available shrubs. Currently (‘96), there is no sign of wildlife use.

The study area falls within the "Foxol-Elzinga Association" soil mapping unit. This designation describes shallow and excessively drained soils with textures ranging from silt loam to gravelly loam. The area soils tend to be gravelly with abundant surface rock. Because maximum soil depth is only about 17 inches, these soils become very dry in the summer. Depth to fractured bedrock is less than 10 inches in many places (Chadwick et al. 1975). Soils on the site have a clay loam texture with a neutral reactivity (pH of 6.7). Rocks are common on the surface and throughout the profile. Effective rooting depth (see methods) was estimated at less than 8 inches. Soil temperature is relatively high averaging nearly 72° F at a depth of about 10 inches. Due to the abundance of rock, vegetation and litter cover, erosion is not currently a problem on the site.

Quality browse forage is in short supply. Rocky Mountain smooth sumac is the most abundant species, a vigorously sprouting shrub that tends to die-back severely each year. This species occurs in large patches over most of the Brigham-Willard face. It has replaced much of the native big sagebrush in the last couple of decades. Small numbers of mountain big sagebrush (200 plants/acre) still persist, but they have had a low reproductive potential resulting in very little recruitment of young plants into the population. Both smooth sumac and big sagebrush sustained moderate to heavy use in 1984, although current use is light. Other browse include increasers such as stickyleaf low rabbitbrush and broom snakeweed, with patches of taller shrubs such as bigtooth maple and black chokecherry.

Herbaceous species currently determine the study area's dominant vegetative character. Grasses are the most productive class of plants and consist primarily of bluebunch wheatgrass and cheatgrass brome. Sandberg bluegrass occurs frequently but produces little forage. Annual grasses and annual forbs were not included in the previous sampling method, so no abundance comparisons can be made. Forb composition is dominated by a mixture of poor value perennials and a variety of weeds. The most abundant forbs include milkweed, dyers woad, yellow salsify and ragweed.

1984 APPARENT TREND ASSESSMENT

This study area is representative of the depleted range that extends all along west-facing mountain slopes of management unit 3. Soil condition is perhaps a little poorer than average and appears to be declining. Vegetatively, most of the native plants have been replaced by undesirable shrubs and noxious weeds. Trend appears to be down and no prospects for improvement are in sight.

1990 TREND ASSESSMENT

The limited browse on this rather depleted site has been only lightly used the last several years. It has good vigor. The limited distribution of mountain big sagebrush has experienced a small increase in density. The stand of smooth sumac is unchanged. Bluebunch wheatgrass declined significantly in frequency, but overall the site remains stable but in poor range condition. Although there is a substantial amount of similar range on the west-facing slopes of the Wasatch Mountains in this unit, there is also a surprisingly large amount of productive range on the narrow terraces. Just below the steep and rocky study site, there is a stand of lightly used big sagebrush and tall bitterbrush.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3), should carefully monitor weedy species, especially dyers woad which has increased

1996 TREND ASSESSMENT

Trend for soil is up due to an increase in percent litter cover and a decline in percent bare ground. Erosion is not currently a problem on this site. The browse trend is stable but dominated by smooth sumac. Density of mountain big sagebrush is similar to 1990 estimates. The small decline in density is likely the result of the much larger sample size used this year giving more accurate estimates of shrub density. Density of smooth sumac is unchanged. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses has declined. Both bluebunch wheatgrass and Sandberg bluegrass have declined in their sum of nested frequency values. Currently, annual brome grass accounts for 62% of the grass cover. The forb composition is extremely poor and dominated by weeds including ragweed, milkweed, dyers woad and yellow salsify. Dyers woad has increased in abundance with each reading.

TREND ASSESSMENT
soil - up (5)
browse - stable but dominated by smooth sumac (3)
herbaceous understory - down and in poor condition due to weedy composition (1)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	202	172	168	82	74	70	12.33
G	Bromus brizaeformis (a)	-	-	104	-	-	40	.85
G	Bromus japonicus (a)	-	-	273	-	-	87	6.67
G	Bromus tectorum (a)	-	-	332	-	-	94	14.35
G	Poa bulbosa	$_{a}$-	$_{b}$15	$_{a}$-	-	5	-	-
G	Poa secunda	$_{b}$69	$_{b}$79	$_{a}$28	32	36	12	.81
Total for Annual Grasses		0	0	709	0	0	221	21.88
Total for Perennial Grasses		271	266	196	114	115	82	13.14
Total for Grasses		271	266	905	114	115	303	35.03
F	Achillea millefolium	4	-	2	2	-	1	.15
F	Agoseris glauca	4	2	-	2	1	-	-
F	Allium acuminatum	$_{b}$9	$_{b}$12	$_{a}$-	6	6	-	-
F	Alyssum alyssoides (a)	-	-	2	-	-	1	.00
F	Ambrosia psilostachya	$_{b}$36	$_{ab}$32	$_{a}$21	15	14	10	.32
F	Apocynum androsaemifolium pumilum	1	-	-	1	-	-	-
F	Artemisia ludoviciana	-	1	-	-	1	-	-
F	Asclepias hallii	10	9	14	4	5	5	1.12
F	Comandra pallida	-	-	2	-	-	1	.03
F	Crepis acuminata	-	4	-	-	1	-	-
F	Epilobium brachycarpum (a)	-	-	9	-	-	3	.04
F	Galium aparine (a)	-	-	2	-	-	1	.00
F	Hackelia patens	$_{b}$23	$_{a}$-	$_{a}$-	12	-	-	-
F	Isatis tinctoria	$_{a}$48	$_{ab}$81	$_{b}$97	26	36	46	1.14
F	Lactuca serriola	$_{a}$-	$_{b}$26	$_{a}$9	-	12	4	.04
F	Lomatium spp.	$_{a}$-	$_{c}$131	$_{b}$38	-	64	16	.08
F	Microseris nutans	4	-	-	2	-	-	-
F	Phlox longifolia	-	7	1	-	3	1	.00
F	Tragopogon dubius	$_{a}$12	$_{b}$43	$_{c}$118	7	20	54	2.30
Total for Annual Forbs		0	0	13	0	0	5	0.04
Total for Perennial Forbs		151	348	302	77	163	138	5.20
Total for Forbs		151	348	315	77	163	143	5.25

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 5

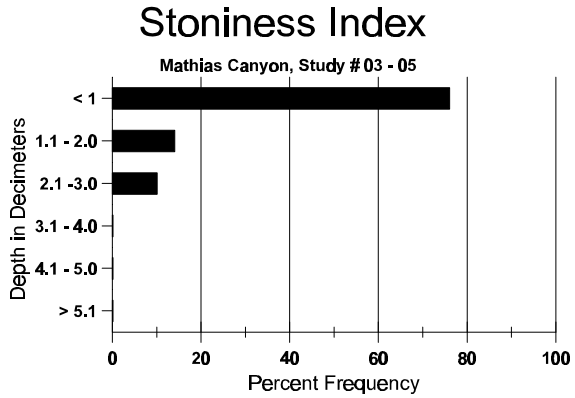
Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	0	1.25
B	Artemisia tridentata vaseyana	9	.59
B	Gutierrezia sarothrae	22	.92
B	Opuntia fragilis	4	.03
B	Rhus glabra cismontana	70	8.48
Total for Browse		105	11.30

BASIC COVER --
Herd unit 03 , Study no: 5

Cover Type	Nested Frequency '96	Average Cover % '84	'90	'96
Vegetation	380	1.25	8.50	47.75
Rock	341	52.00	43.00	44.36
Pavement	90	5.50	13.75	2.08
Litter	394	34.75	30.50	38.79
Cryptogams	2	0	.25	.01
Bare Ground	55	6.50	4.00	.32

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 05, Mathias Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
7.6	71.5 (9.8)	6.7	27.9	42.1	30.0	2.5	18.8	172.8	.4



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 5

Type	Quadrat Frequency '96
Deer	2

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 5

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	106	123	0
% Plants Showing		'84		Moderate Use 00%		Heavy Use 00%			Poor Vigor 00%						%Change			
		'90		00%		00%			00%									
		'96		00%		00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)													'84		0	Dec:		-
													'90		0			-
													'96		0			-
Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
M	84	-	-	4	-	-	-	-	-	-	4	-	-	-	266	26	30	4
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	31	51	4
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	22	42	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		'84		Moderate Use 00%		Heavy Use 100%			Poor Vigor 00%						%Change +20%			
		'90		00%		00%			00%						-40%			
		'96		00%		00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)													'84		266	Dec:		0%
													'90		332			0%
													'96		200			10%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	12	9	3
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	9	17	4
	96	27	-	-	1	-	-	-	-	-	28	-	-	-	560	11	17	28
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	-	1	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+40%
'90	00%	00%	20%	+55%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	200	Dec:		0%
'90	332			20%
'96	740			0%

Opuntia fragilis																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	1	-	-	2	-	-	-	40	5	3	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	80			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Prunus virginiana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	1	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	20	-	-	-	-	-	-	-	-	20	-	-	-	1333			20
	90	40	-	-	-	-	-	-	-	-	4	21	15	-	2666			40
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	19	12	-	-	-	-	-	-	28	-	3	-	2066	13	7	31
	90	-	1	-	-	-	-	-	-	-	-	1	-	-	66	34	53	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	37%	24%	06%	-20%
'90	02%	00%	37%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	3399	Dec:	-
	'90	2732		-
	'96	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rhus glabra cismontana																		
S	84	2	-	1	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	16	-	-	-	-	-	-	-	-	16	-	-	-	1066			16
	90	15	-	-	-	-	-	-	-	-	15	-	-	-	1000			15
	96	42	-	-	-	-	-	-	-	-	34	7	1	-	840			42
M	84	-	-	30	-	-	-	-	-	-	30	-	-	-	2000	22	18	30
	90	9	27	-	-	-	-	-	-	-	36	-	-	-	2400	23	20	36
	96	115	11	-	-	-	-	-	-	-	126	-	-	-	2520	23	27	126
D	84	-	-	5	-	-	-	-	-	-	5	-	-	-	333			5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	240			12

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	69%	00%	+ 0%
'90	53%	00%	00%	+ 0%
'96	07%	00%	.58%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	3399	Dec:	10%
	'90	3400		0%
	'96	3400		1%

Trend Study 3-6-01

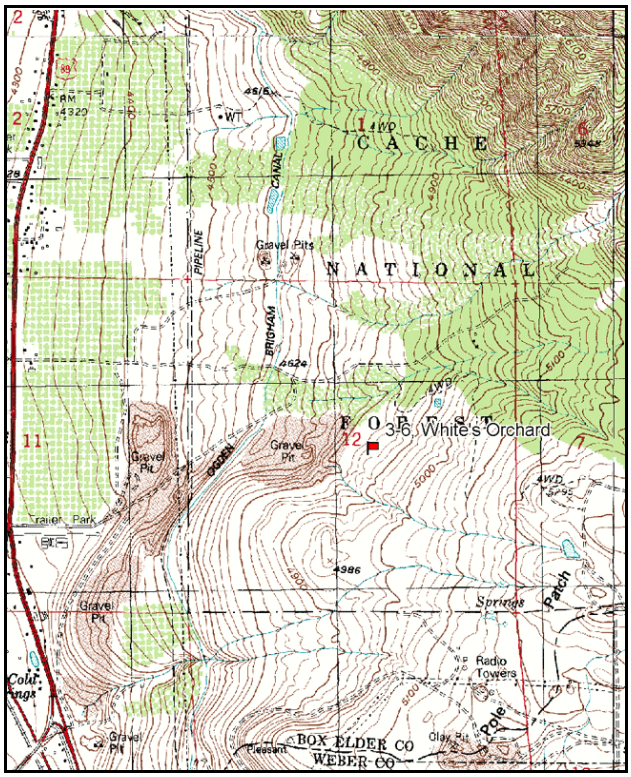
Study site name: White's Orchard . Vegetation type: Big Sagebrush-Grass .

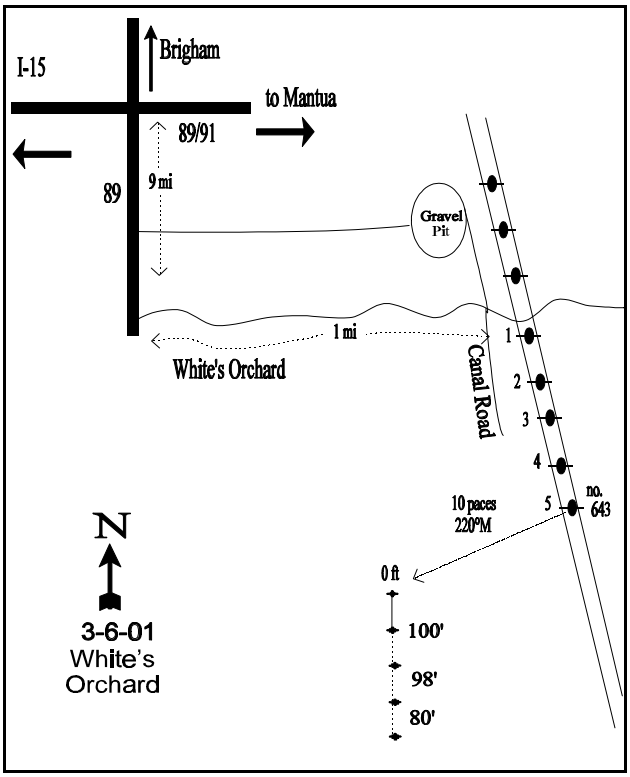
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11 & 71ft), line 2 (34ft), line 3 (95ft), line 4 (59ft).

LOCATION DESCRIPTION

In Brigham City, at the junction of US 89 and 91, turn south on US 89 and proceed 9.0 miles. Turn left and drive through White's Orchard, stopping after 1.0 mile where the power lines cross the road. Power poles run at 137 degrees magnetic. Walk south to the fifth pole, number 643. From the base of this pole walk 10 paces at 220 degrees magnetic to the baseline 0-foot stake with browse tag #7920. The first two posts are bent over.





Map Name: Plain City

Diagrammatic Sketch

Township 7N , Range 2W , Section 12

UTM 4578643 N 415163 E

DISCUSSION

Trend Study No. 3-6

The White's Orchard study, located near the south boundary of the herd unit, samples an extensive big sagebrush type on a moderate (20%), northwest slope. Elevation of the site is 4,820 feet. Although winter deer use of the area was reportedly heavy in the past, few pellet groups were observed during the 1996 and 2001 readings. Pellet group transect data taken in 2001 estimated less than 1 deer day use/acre (2 ddu/ha). Browse utilization was intense in 1984, but it appeared to be largely a function of livestock use. Cattle pats were very common in 1984 as utilization of the available grass forage approached 80%. In 1996 and 2001, cattle sign was moderately abundant and probably high because of a watering trough near the base of the hill. In 2001, cattle use was estimated at 68 cow days use/acre (168 cdu/ha) from pellet transect data. Coyote scat was also noted in the area along with some den sites ('96).

Soil is a "Wasatch Gravelly Sandy Loam," a moderately deep alluvially deposited soil with slightly alkaline characteristics. Water permeability is rapid and drainage is excessive. Soils on the site have a sandy loam texture with a soil reaction that is moderately acidic (6.0 pH). Small sized gravel is found on the surface and within the profile. Effective rooting depth (see methods) was estimated at less than 10 inches. Average soil temperature is moderately high at 67°F at an average depth of 12 inches. Complete soil drying may occur as deep as 35 inches for 90 consecutive days in summer. This soil has a moderate erosion hazard but current vegetation and litter cover appear sufficient to control most soil movement. Heavy cattle grazing and trampling damage has resulted in some sheet and gully erosion in the past.

Browse composition consists almost exclusively of basin big sagebrush. During the 1984 and 1990 readings, the sagebrush was classified as mountain big sagebrush (*Artemisia tridentata vaseyana*). However, in 1996 this was changed to basin big sagebrush *(A. tridentata tridentata)*. The only other shrub present is an occasional broom snakeweed. Sagebrush density is moderate, estimated at nearly 2,000 plants/acre in 2001. Current density estimates are lower than those taken in 1984 and 1990. However, the number of young plants in the population and 1,000 plants/acre of decadent sagebrush appear to have died since 1990. Dead plants, first sampled in 1996, number about 1,100 plants/acre in 1996 and 2001, supporting the assumption that the sagebrush population has declined with the long periods of drought and winter injury since 1985. The result is a smaller and healthier population of sagebrush which is lightly utilized, generally in good vigor with a lower percent decadency (decreasing from 48% in 1984 to 16% in 2001). Utilization was extremely heavy in 1984, with all plants sampled being heavily hedged (>60% of twigs browsed). From 1990-2001, use has decreased and is currently ('01) classified as light. In 1996 and 2001, recruitment from young plants was moderate at 14% and 24% respectively. However, the average number of young since 1984 is not high enough to replace the dead in the population at the present time. Average leader growth on basin big sage was just under 3 inches in 2001.

The herbaceous understory is dominated by perennial grasses with the principal species being bulbous bluegrass and intermediate wheatgrass. Bulbous bluegrass, a less desirable perennial, significantly increased in nested frequency between 1996 and 2001. It currently accounts for 67% of the grass cover and 51% of the total vegetation cover. Intermediate wheatgrass maintained a stable nested frequency in 2001, providing 21% of the grass cover. In 2001, cheatgrass and Japanese brome combine to provide 11% of the grass cover. Cheatgrass significantly increased in nested frequency and Japanese brome remained stable between 1996 and 2001. Forbs were nearly absent in 1984 and 1990, but have increased since. Composition is extremely poor and dominated by annuals. Storksbill is the most abundant species in 2001. Weedy perennial species which should be closely monitored in the future include: curlycup gumweed, ragweed, sunflower, thistle and tarweed.

1984 APPARENT TREND ASSESSMENT

In spite of light to moderate erosion, this site appears to have a relatively stable soil trend. The lack of steep slope and low precipitation as well as a fair amount of cover, helps prevent excessive soil loss. Although subsequent readings of the study plots may indicate otherwise, the vegetative trend appears stable. If heavy cattle grazing persists, it is possible that basin big sagebrush may even increase in density, although plant size, vigor, and vegetative diversity will continue to be limited.

1990 TREND ASSESSMENT

Basin big sagebrush shows a notable increase in density. Further data comparisons reveal that the number of mature sagebrush increased from 1,266 to 1,600 plants per acre. The largest increase was in the number of seedlings. The shrubs are vigorous with light to moderate hedging. While the increase in sagebrush could be related to heavy cattle grazing on this private land, the frequency of intermediate wheatgrass also increased. The amount of litter cover decreased and the percentage of bare soil increased from 1% to 15%, but overall there is minimal soil erosion.

TREND ASSESSMENT
soil - stable (3)
browse - improving (4)
herbaceous understory - stable (3)

1996 TREND ASSESSMENT

The soil trend is up slightly. Percent bare ground declined from 15% to 9%. Erosion is not currently a problem. Trend for browse is stable. The sagebrush population has declined due to a reduction in young and decadent plants, but the number of mature plants has actually increased. Seedlings and young are less abundant yet appear in sufficient numbers to maintain or even increase the current population. Utilization is mostly light and percent decadence has declined from 30% to 14%. Although the herbaceous understory continues to be dominated by grasses, sum of nested frequency for perennial grasses has declined slightly. Nested frequency of intermediate wheatgrass declined significantly. Annual grasses and bulbous bluegrass are abundant and account for nearly half of the grass cover. Forbs are lacking and species composition is extremely poor. Several aggressive weeds were found on the site which included ragweed, thistle, curlycup gumweed, sunflower and tarweed. Trend for the herbaceous understory is considered slightly down due to the significant decline in intermediate wheatgrass.

TREND ASSESSMENT
soil - up slightly (4)
browse - stable (3)
herbaceous understory - slightly down because of the losses to key perennial grass species (2)

2001 TREND ASSESSMENT

Soil trend is stable. Perennial grasses dominate the understory, and although bulbous bluegrass is a less desirable species, it is fairly good at holding soils in place. Bare ground remains near 1996 levels. Trend for browse is slightly down. Due to low deer numbers in this unit, use on sagebrush remains light. Vigor is generally good. However, the population appears to be slowly decreasing as recruitment from the young age class is not adequate to replace the dead in the population. Sagebrush strip frequency also declined in 2001. Trend for the herbaceous understory is slightly down. Although sum of nested frequency for perennial grasses increased, most of this increase is due to the significant increase in bulbous bluegrass, a less desirable

species. Cheatgrass brome also significantly increased in nested frequency. Forb composition is poor with annuals and weedy perennials being the most abundant.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 6

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron cristatum	a6	a1	ab9	b24	3	1	4	11	.10	.47
G	Agropyron intermedium	ab222	b248	ab190	a180	82	88	58	60	14.46	10.28
G	Agropyron spicatum	-	-	-	4	-	-	-	2	-	.06
G	Bromus japonicus (a)	-	-	212	216	-	-	70	81	7.41	2.67
G	Bromus tectorum (a)	-	-	a36	b106	-	-	12	36	.89	2.66
G	Festuca myuros (a)	-	-	4	6	-	-	4	4	.04	.02
G	Poa bulbosa	b270	a146	a141	c325	99	61	49	93	3.67	32.27
G	Sporobolus cryptandrus	-	-	5	-	-	-	3	-	.18	-
Total for Annual Grasses		0	0	252	328	0	0	86	121	8.35	5.36
Total for Perennial Grasses		498	395	345	533	184	150	114	166	18.43	43.09
Total for Grasses		498	395	597	861	184	150	200	287	26.78	48.46
F	Alyssum alyssoides (a)	-	-	-	5	-	-	-	3	-	.01
F	Ambrosia psilostachya	a-	a-	a5	b23	-	-	3	12	.04	1.12
F	Artemisia ludoviciana	a-	a-	a3	b9	-	-	1	3	.03	1.03
F	Cirsium spp.	-	-	1	5	-	-	1	2	.00	.01
F	Collomia linearis (a)	-	-	-	2	-	-	-	2	-	.01
F	Collinsia parviflora (a)	-	-	-	8	-	-	-	3	-	.09
F	Cynoglossum officinale	-	-	-	3	-	-	-	1	-	.03
F	Descurainia pinnata (a)	-	-	b48	a13	-	-	17	7	.79	.06
F	Draba spp. (a)	-	-	-	14	-	-	-	5	-	.02
F	Epilobium brachycarpum (a)	-	-	b52	a8	-	-	24	4	.20	.02
F	Erodium cicutarium (a)	-	-	a41	b142	-	-	16	51	.46	4.96
F	Erigeron pumilus	a-	a-	b8	a-	-	-	4	-	.21	.00
F	Grindelia squarrosa	a-	a-	b12	a-	-	-	6	-	.20	-
F	Helianthus annuus (a)	-	a3	b25	a-	-	2	12	-	.28	-
F	Holosteum umbellatum (a)	-	-	1	-	-	-	1	-	.00	-
F	Lactuca serriola	a-	a-	b11	b24	-	-	6	10	.20	.12
F	Madia glomerata (a)	-	-	17	-	-	-	8	-	.04	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Plantago patagonica (a)	-	-	32	22	-	-	14	11	.14	.10
F	Polygonum douglasii (a)	-	-	$_{b}$35	$_{a}$12	-	-	19	5	.17	.05
F	Taraxacum officinale	-	-	-	3	-	-	-	1	-	.03
F	Tragopogon dubius	1	-	1	-	1	-	1	-	.00	-
Total for Annual Forbs		0	3	251	226	0	2	111	91	2.09	5.33
Total for Perennial Forbs		1	0	41	67	1	0	22	29	0.69	2.36
Total for Forbs		1	3	292	293	1	2	133	120	2.79	7.70

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 6

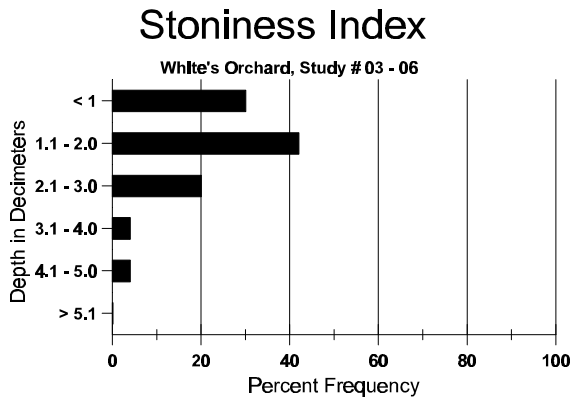
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata tridentata	66	51	16.13	7.64
B	Gutierrezia sarothrae	1	0	-	-
Total for Browse		67	51	16.13	7.64

BASIC COVER --
Herd unit 03 , Study no: 6

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	364	379	1.00	15.50	45.02	65.48
Rock	67	19	0	.50	.57	.19
Pavement	208	111	17.25	7.00	3.35	2.08
Litter	400	353	80.50	56.75	53.93	37.77
Cryptogams	99	33	0	5.50	2.65	.41
Bare Ground	249	185	1.25	14.75	9.26	8.38

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 06, White's Orchard

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.7	67.2 (12.0)	6.0	64.6	16.1	19.4	1.9	17.1	137.6	.3



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 6

Type	Quadrat Frequency '96	Quadrat Frequency '01	Pellet Transect Pellet Groups per Acre '01	Pellet Transect Days Use per Acre (ha) '01
Rabbit	1	1	-	-
Deer	1	1	9	1 (2)
Cattle	14	8	818	68 (168)

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 6

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	156	-	-	-	-	-	-	-	-	156	-	-	-	10400			156
	96	33	-	-	-	-	-	-	-	-	33	-	-	-	660			33
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	5	-	-	-	-	-	-	4	-	1	-	333			5
	90	20	-	-	-	-	-	-	-	-	20	-	-	-	1333			20
	96	19	1	-	-	-	-	-	-	-	19	-	1	-	400			20
	01	24	-	-	-	-	-	-	-	-	24	-	-	-	480			24
M	84	-	-	19	-	-	-	-	-	-	19	-	-	-	1266	29	20	19
	90	18	6	-	-	-	-	-	-	-	24	-	-	-	1600	30	38	24
	96	90	9	-	-	-	-	-	-	-	86	-	12	1	1980	31	40	99
	01	59	-	-	-	-	-	-	-	-	55	1	3	-	1180	29	40	59
D	84	-	-	21	-	-	-	-	-	1	16	-	6	-	1466			22
	90	10	8	-	1	-	-	-	-	-	12	-	-	7	1266			19
	96	13	4	1	1	-	-	-	-	-	12	1	3	3	380			19
	01	16	-	-	-	-	-	-	-	-	11	-	-	5	320			16
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1160			58
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	1100			55

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	15%	+27%
'90	22%	00%	11%	-34%
'96	10%	.72%	14%	-28%
'01	00%	00%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	3065	Dec:	48%
	'90	4199		30%
	'96	2760		14%
	'01	1980		16%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	8	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'84	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%
'01	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'84	200	Dec:		-
'90	0			-
'96	40			-
'01	0			-

*****Suspended*****

Trend Study 3-7-96

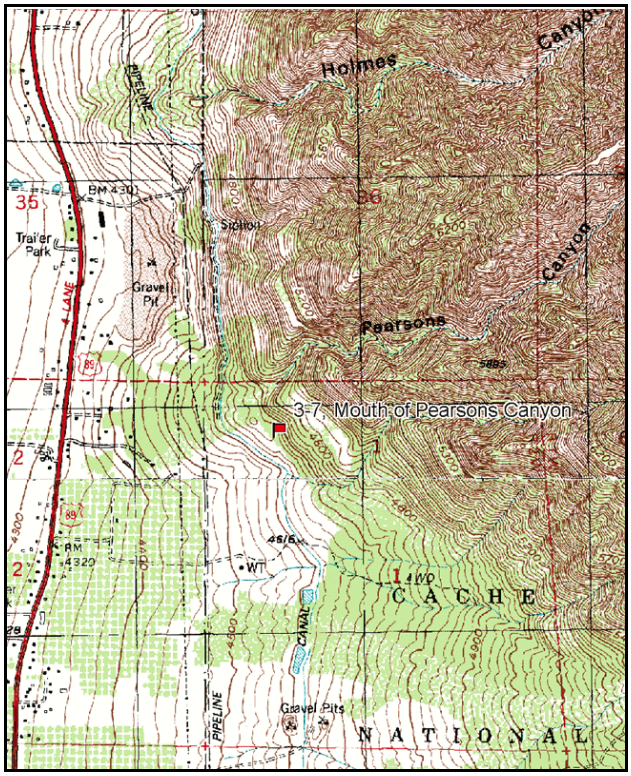
Study site name: Mouth of Pearson's Canyon . Vegetation type: Perennial Grass .

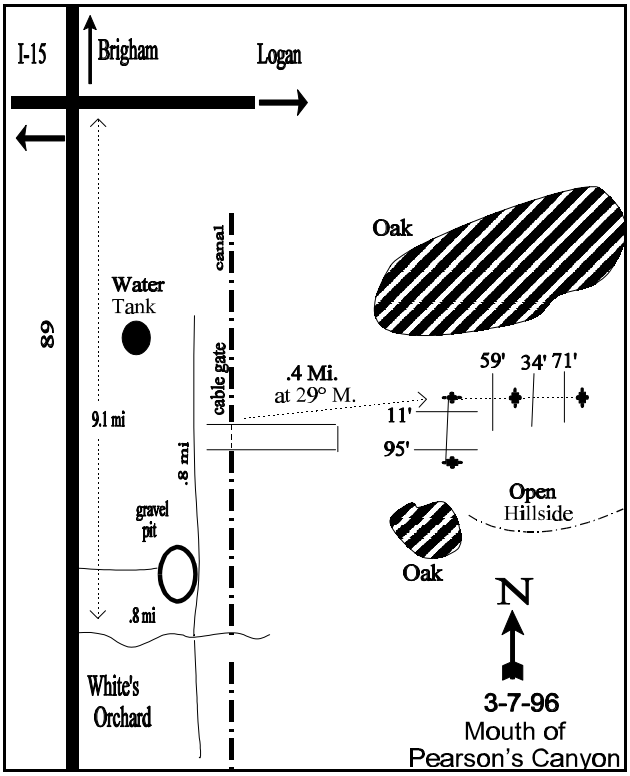
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (59ft), line 3 (34 & 71ft).

LOCATION DESCRIPTION

From the junction of Highway 89 and 91 in Brigham City proceed south on 89 for 9.1 miles. Turn left at White's Orchard and travel east for 0.8 miles. Before crossing the canal turn left (north) and proceed 0.8 miles. Turn right and walk across the canal continuing 0.4 miles at a bearing of 29 degrees magnetic to the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7922. The rest of the baseline doglegs off the 0-foot baseline stake at a bearing of 29 degrees magnetic.





Map Name: Willard

Diagrammatic Sketch

Township 7N , Range 8W , Section 1

UTM 4580879 N 415012 E

DISCUSSION

Trend Study No. 3-7

***SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site was evaluated by the Project Leader and was suspended due to low browse abundance and no signs of use by wildlife at the present time. It also is in close proximity to other trend studies in the unit. Text and data tables are included from the 1996 report.

The Mouth of Pearson's Canyon study samples critical deer winter range at 4,680 feet in elevation, thought to be important in the early 1980's. The site has a southwest exposure and a moderate slope of 25%. This entire area is characterized by small to medium sized clumps of Gambel oak separated by larger open areas. The site samples an opening surrounded by various sized oak clones. There is little sagebrush to sample directly on the site. Sagebrush are more abundant lower down the slope. Judging from pellet group frequency and browse utilization, the intensity of deer use is light. The area contains relatively little available browse to attract deer. Even oak clumps have little available forage. Livestock use is light.

Soil at the site is part of the "Ridd Rock Outcrop Complex." These are shallow, very coarse textured, well-drained soils that formed in alluvium and colluvium from quartzite, gneiss and schist. Soil reaction is neutral throughout the 24 inch soil profile. Water permeability is moderately rapid with low water holding capability. The result is a soil that often is totally dry in mid-summer (Chadwick et al. 1975). Soils at the site are fairly deep, dry and gravely with a sandy loam texture and a neutral soil reaction (6.8 pH). Effective rooting depth (see methods) was estimated at 14 inches with a relatively high soil temperature of nearly 76° F at an average depth of 13 inches. Organic matter is relatively low at 1.3%. The study site has fair plant cover composed of perennial grasses, annual grasses and weedy forbs. Relatively little browse is present. The rate of erosion is negligible.

The principle browse species are Wyoming big sagebrush and Gambel oak. The former species constitutes a sparse stand that will probably become even more so in the future. Although existing plants show fair vigor and generally light use, they are currently (1996) so few in number (100 plants/acre) that it is difficult to envision any significant increase because of the competitive nature of the herbaceous understory. Gambel oak occurs as large mature clones that contain little available forage due to its height. Oak shows no sign of expansion or clone enlargement.

Herbaceous composition consists of warm season perennial grasses, annual grasses and forbs, and perennial or biennial weeds. The principal perennial grasses are red three-awn and sand dropseed, both of which are moderately abundant but show no evidence of current or past grazing use. Annual grasses include cheatgrass and rattail fescue, both of which are abundant and account for 79% of the grass cover. The forb composition is extremely poor with common ragweed and hairy goldaster providing 79% of the forb cover. Perennial forbs possessing even moderate forage value are rare.

1984 APPARENT TREND ASSESSMENT

Soil trend seems relatively stable. Although some erosion is apparent, it is not serious. Vegetative trend indicators suggest a declining or at best, stable population of Wyoming big sagebrush. Gambel oak clones are self-sustaining and are neither decreasing or expanding. The most likely trend would seem to be a continued increase in weed densities.

1990 TREND ASSESSMENT

Identified as a perennial grass range type in 1984, the area could also be classified as a oak/sagebrush range type. Most openings on the slope support moderately dense stands of sagebrush, a condition lacking on the study site. While it remains sparse, Wyoming big sagebrush increased in density and in the percentage of seedling and young plants. It is very vigorous with good growth and seed production. The sagebrush do not appear to be browsed and there is no sign of recent deer use. Cows were grazing in the area, apparently for the first time in many years. They prefer sand dropseed, the only palatable herbaceous forage on the site. Dropseed, along with the undesirable three-awn, shows a significant increase in sum of nested frequency since 1984. Other weedy species, especially hairy goldaster and Dyers woad, have also increased. One large, mature oak clone was encountered both years. The soil is shallow and loosely compacted. It is easily disturbed and has a high erosion potential. The soil trend currently appears stable. The vegetative trend is more difficult to assess. With the predominance of invader and increaser species, it is contradictory to assess an improving trend for the site even though sagebrush is increasing. Future management of this private rangeland, where an increase in shrubs is an unlikely goal, will have the greatest impact on the site.

TREND ASSESSMENT
soil - stable (3)
browse - upward, but still only about 500 sagebrush per acre (5)
herbaceous understory - downward, most of the species are weedy increasers, especially three-awn, dyers woad, and hairy goldaster (1)

1996 TREND ASSESSMENT

The soil trend is up with a significant decline in percent bare ground (19% to <1%) and an increase in litter cover. Vegetation and litter cover are very abundant, well dispersed and effectively limit erosion. The browse trend appears stable but limited in density. The change in density from 1990 to 1996 is mostly the result of the much larger sample used in 1996, because the number of dead in the population cannot explain the drop in density. Oak appears to be unutilized with a stable population density. The herbaceous understory is poor and dominated by annual grasses and perennial weeds. Cheatgrass and rattail fescue account for 79% of the grass cover, while common ragweed and hairy goldaster provide 79% of the forb cover. The only useful species on the site that is fairly common is sand dropseed. Sum of nested frequency for perennial grasses and forbs declined since 1990. Trend is considered down.

TREND ASSESSMENT
soil - up (5)
browse - stable but very low population (3)
herbaceous understory - down and in poor condition and composition (1)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Aristida purpurea	$_{b}$161	$_{c}$212	$_{a}$115	70	83	53	4.99
G	Bromus tectorum (a)	-	-	384	-	-	100	26.94
G	Festuca myuros (a)	-	-	139	-	-	48	2.77
G	Poa bulbosa	-	1	-	-	1	-	-
G	Poa pratensis	-	2	-	-	1	-	-
G	Poa secunda	5	10	3	2	5	1	.03
G	Sporobolus cryptandrus	$_{a}$35	$_{ab}$50	$_{b}$81	18	22	35	2.69
Total for Annual Grasses		0	0	523	0	0	148	29.72
Total for Perennial Grasses		201	275	199	90	112	89	7.71
Total for Grasses		201	275	722	90	112	237	37.43
F	Alyssum alyssoides (a)	-	-	11	-	-	5	.02
F	Ambrosia artemisifolia	$_{b}$226	$_{a}$61	$_{a}$101	80	29	44	3.47
F	Artemisia ludoviciana	19	15	26	7	5	9	1.10
F	Astragalus utahensis	$_{b}$14	$_{a}$6	$_{a}$-	8	3	-	.21
F	Cuscuta spp.	-	-	-	-	-	-	.03
F	Erodium cicutarium (a)	-	-	47	-	-	18	.29
F	Euphorbia spp.	$_{a}$-	$_{a}$-	$_{b}$23	-	-	13	.29
F	Heterotheca villosa	$_{a}$70	$_{b}$206	$_{a}$81	32	79	40	6.87
F	Isatis tinctoria	$_{a}$-	$_{b}$63	$_{a}$7	-	27	3	.10
F	Lactuca serriola	-	7	-	-	3	-	-
F	Lygodesmia grandiflora	$_{a}$-	$_{a}$-	$_{b}$13	-	-	7	.67
F	Tragopogon dubius	-	-	1	-	-	1	.00
Total for Annual Forbs		0	0	58	0	0	23	0.31
Total for Perennial Forbs		329	358	252	127	146	117	12.75
Total for Forbs		329	358	310	127	146	140	13.06

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 7

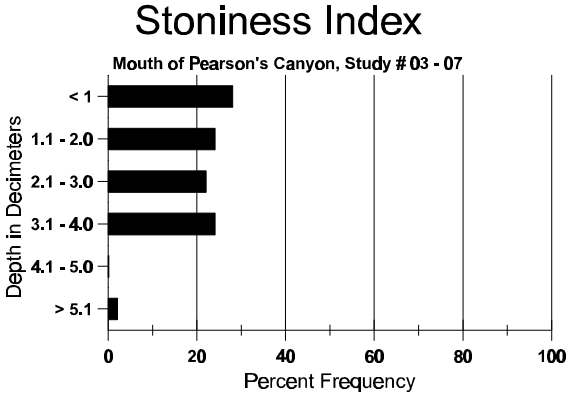
Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata wyomingensis	4	.93
B	Opuntia fragilis	8	.15
Total for Browse		12	1.08

BASIC COVER --
Herd unit 03 , Study no: 7

Cover Type	Nested Frequency '96	Average Cover % '84	'90	'96
Vegetation	393	9.50	14.00	56.20
Rock	228	7.00	8.00	11.60
Pavement	161	16.00	13.00	2.90
Litter	395	54.00	46.25	59.95
Cryptogams	23	0	0	.10
Bare Ground	66	13.50	18.75	.53

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 07, Mouth of Pearson's Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.1	75.8 (12.8)	6.8	77.6	10.4	12.0	1.3	13.8	105.6	.4



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 7

Type	Quadrat Frequency '96
Rabbit	4
Deer	3
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 7

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	4	-	-	1	-	-	-	-	-	5	-	-	-	166			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	24	39	1
	90	9	-	-	-	-	-	-	-	-	8	-	1	-	300	26	20	9
	96	1	3	-	-	-	-	-	-	-	4	-	-	-	80	22	48	4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	50%	00%	00%	+86%
'90	00%	00%	07%	-79%
'96	60%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	66	Dec:		-
'90	466			-
'96	100			-

Chrysothamnus nauseosus albicaulis																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	72	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	-
'90	0		-
'96	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia fragilis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	1	-	1	-	66			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	5	9	1
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	7	14	10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	33%	+55%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'84	0		-
	'90	99		-
	'96	220		-

Quercus gambelii																		
M	84	-	-	-	-	1	-	-	-	-	1	-	-	-	33	69	61	1
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	33	98	106	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	38	46	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	100%	00%	00%	+ 0%
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'84	33		-
	'90	33		-
	'96	0		-

*****Suspended*****

Trend Study 3-8-96

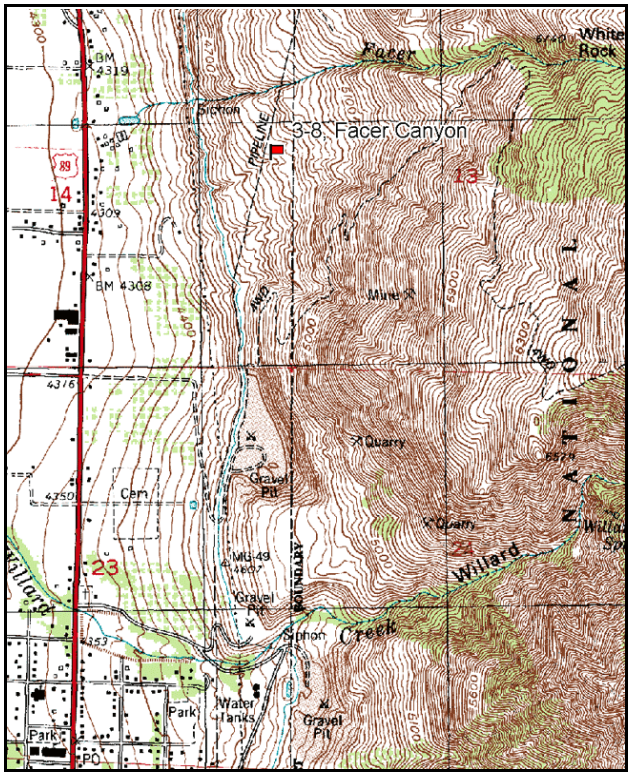
Study site name: Facer Canyon . Vegetation type: Big Sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

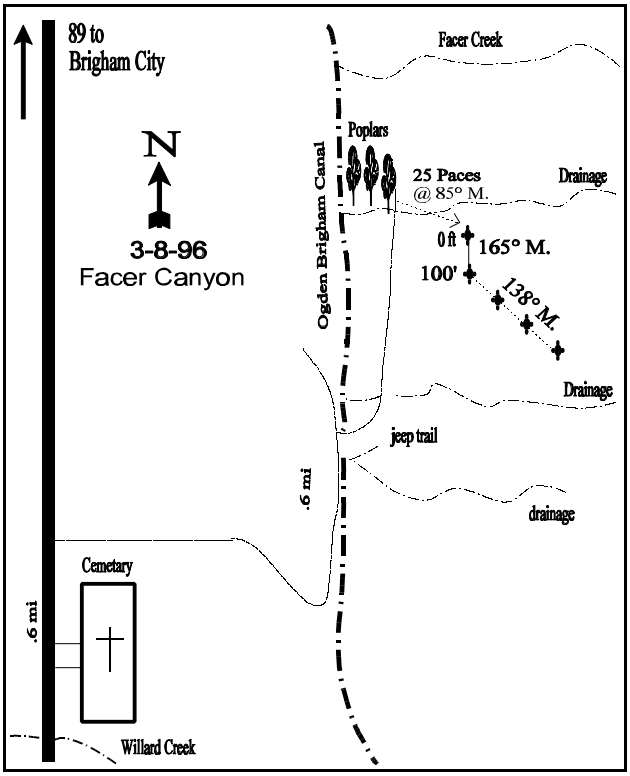
LOCATION DESCRIPTION

From Willard, proceed north on US 89 to Willard Creek and begin to note mileage. Proceed north 0.6 miles to a private road just south of marker 367 and turn right. Proceed to the Ogden/Brigham canal, turn left on west side of canal and proceed north 0.6 miles to a flood water bridge. Park here and walk across bridge, turn left (north) and follow trail approximately 0.25 miles crossing one wash and stopping at second wash. From the poplar trees on north side of wash, walk 25 paces at 85 degrees magnetic to the 0-foot baseline stake.



Map Name: Willard

Township 8N , Range 2W , Section 14



Diagrammatic Sketch

UTM 4587031 N 414218 E

DISCUSSION

Trend Study No. 3-8

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site burned in 1995 and was not rehabilitated. It was sampled in 1996 following the burn. This site was evaluated by the Project Leader in 2001. It was suspended due to the loss of browse after the fire and no apparent wildlife use. Text and data tables are included from the 1996 report.

The Facer Canyon study site, located on the upper Lake Bonneville terrace, slopes moderately (15%) to the west at an elevation of 4,800 feet. Like much of the Brigham City-Willard face, this area was considered critical deer winter range in past years. Deer use, as estimated from pellet group frequency and browse utilization in 1984 and 1990, was mostly light since 1990. No deer or elk pellet groups were encountered in 1996. The dominant range type is a mixed population of basin and mountain big sagebrush with an herbaceous understory composed principally of annual forbs and grasses, a few perennial or biennial weeds, and a sparse cover of perennial grass.

Soil is "Wasatch Gravelly Sandy Loam," similar to that described in the write-up for study number 3-6. This is a deep, well drained soil with good potential for producing range forage. Although the upper horizons often become very dry in summertime, potential rooting depth is good enough to allow deeper rooted species uninterrupted access to available water (Chadwick et al. 1975). Soils at the site have a sandy clay loam texture with a neutral soil reaction (6.8 pH). The soil is extremely gravely with an effective rooting depth (see methods) estimated at almost 12 inches. Soil temperature is moderately high, averaging nearly 72° F at an average depth of over 15 inches. The site supports abundant vegetation and litter cover which adequately protects the soil from erosion.

Browse composition consisted of a dominant population of mixed basin and mountain big sagebrush and scattered plants of broom snakeweed and white rubber rabbitbrush in 1984 and 1990. The sagebrush was classified as all basin big sagebrush *(Artemisia tridentata tridentata*) in 1984. During the 1990 reading, the sagebrush was split and classified as both basin big sagebrush and mountain big sagebrush *(A. tridentata vaseyana)*. The big sagebrush varied in size from new seedlings, of which there were many, to mature plants in excess of four feet in height. A large number of established seedlings (i.e., 2-3 years old) in comparison to decadent plants, suggests that the population was at least maintaining itself if not actually increasing in density. However, given the size of mature plants it is difficult to see how the stand could become more dense. Utilization varied between individual shrubs from light to moderate and overall vigor was good.

The site burned during the summer of 1995 which eliminated all of the browse on the site. There was evidently no rehabilitation effort after the fire and there are no remnant sagebrush near or on site.

As of 1990, the herbaceous cover was relatively high, but composition was poor. The area was characterized by a dense growth of annual grasses and forbs as well as perennial and biennial weeds. Perennial grasses, represented mainly by bearded bluebunch wheatgrass and red three-awn, were common but were far outnumbered and outproduced by broad-leafed plants. Undesirable increaser and invader species such as ragweed, autumn willowweed, dyers woad and annual brome grasses comprised the bulk of the understory biomass. After the fire, annual grasses, annual forbs and weeds totally dominate the site. Japanese brome, cheatgrass and rattail fescue account for 98% of the grass cover, while storksbill, dyers woad, prickly lettuce and common sunflower provide 92% of the forb cover. Bluebunch wheatgrass is currently the only desirable perennial grass found on the site. However, it is uncommon and had a quadrat frequency of only 1% in 1996.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable but this entire area is subject to high flows in stream channels that originate higher up the mountain. High spring flows in these channels are extremely destructive and result in very deep and narrow gullies. Sheet erosion does not seem a serious problem at this time. However, large scale slippage and mud slides are a distinct possibility. From a vegetative standpoint, the dominant sagebrush population appears stable or even increasing. The herbaceous understory is comprised of a dense cover of annuals and other weeds which dry up very early in the season and provide abundant fuel capable of carrying a potentially destructive fire.

1990 TREND ASSESSMENT

The dense sagebrush stand on the sampled terrace has increased. Seedling and young shrubs make up 50% of the population. Sagebrush canopy cover is estimated at 28%. The abundant browse forage is virtually unutilized, with very little sign of big game. While bluebunch wheatgrass was more prevalent in 1990, the understory remains in a depleted condition dominated by weedy species.

TREND ASSESSMENT
soil - stable (3)
browse - upward (5)
herbaceous understory - downward, composition is mostly weeds and they are increasing, especially dyers woad; weedy understory could easily carry a destructive fire (1)

1996 TREND ASSESSMENT

A fire burned the site during the summer of 1995. All browse species were eliminated and the herbaceous understory is dominated by annual grasses, annual forbs and weeds. Soil trend is still stable even though percent bare ground increased and percent litter cover declined. The herbaceous vegetation cover and litter are abundant and well dispersed. Erosion is currently not a problem. The browse trend is down and totally absent. There are no signs of any browse in the immediate area. Due to the thick herbaceous understory dominated by annuals and weeds, shrub establishment will be difficult. The only effective way to reestablish sagebrush or other shrubs on the site would be to transplant them. Currently, with no browse species, this site is insignificant as big game winter range. Trend for the herbaceous understory is down. Abundance of grasses and forbs are up but the composition is extremely poor.

TREND ASSESSMENT
soil - stable (3)
browse - down and absent due to fire (1)
herbaceous understory - down and totally dominated by annuals and weeds (1)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	$_{a}$-	$_{b}$12	$_{a}$3	-	6	1	.03
G	Bromus japonicus (a)	-	-	255	-	-	90	10.21
G	Bromus tectorum (a)	-	-	147	-	-	50	6.07
G	Festuca myuros (a)	-	-	53	-	-	22	.89
G	Poa bulbosa	$_{a}$-	$_{ab}$5	$_{b}$16	-	2	6	.30
Total for Annual Grasses		0	0	455	0	0	162	17.19
Total for Perennial Grasses		0	17	19	0	8	7	0.32
Total for Grasses		0	17	474	0	8	169	17.51
F	Achillea millefolium	1	3	-	1	1	-	-
F	Agoseris glauca	-	7	-	-	4	-	-
F	Alyssum alyssoides (a)	-	-	57	-	-	23	.44
F	Ambrosia psilostachya	42	49	27	15	19	14	.45
F	Collinsia parviflora (a)	-	-	10	-	-	5	.10
F	Epilobium brachycarpum (a)	-	-	7	-	-	4	.14
F	Erodium cicutarium (a)	-	-	264	-	-	86	16.23
F	Galium aparine (a)	-	-	22	-	-	10	.12
F	Helianthus annuus (a)	-	-	28	-	-	16	1.20
F	Holosteum umbellatum (a)	-	-	87	-	-	35	.35
F	Isatis tinctoria	$_{a}$13	$_{b}$134	$_{b}$124	7	62	54	6.86
F	Lactuca serriola	$_{a}$-	$_{a}$2	$_{b}$52	-	2	24	1.68
F	Lithospermum ruderale	-	1	-	-	1	-	-
F	Melilotus officinalis	-	-	2	-	-	1	.03
F	Microsteris gracilis (a)	3	-	5	1	-	3	.04
F	Polygonum douglasii (a)	-	-	3	-	-	3	.02
F	Rumex spp.	-	-	1	-	-	1	.15
F	Taraxacum officinale	1	-	-	1	-	-	-
F	Tragopogon dubius	$_{b}$34	$_{ab}$25	$_{a}$18	19	9	10	.40
F	Unknown forb-annual (a)	-	-	4	-	-	2	.01
F	Veronica biloba (a)	-	-	5	-	-	2	.03
Total for Annual Forbs		3	0	492	1	0	189	18.71
Total for Perennial Forbs		91	221	224	43	98	104	9.59
Total for Forbs		94	221	716	44	98	293	28.30

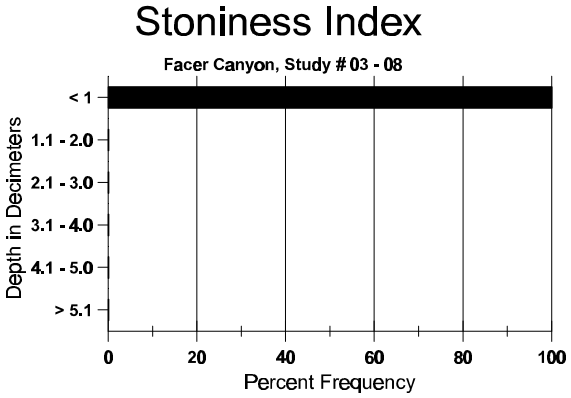
Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BASIC COVER --
Herd unit 03 , Study no: 8

Cover Type	Nested Frequency '96	Average Cover % '84	'90	'96
Vegetation	353	1.00	5.25	49.09
Rock	122	.50	0	3.29
Pavement	251	3.25	6.25	7.67
Litter	384	95.00	85.75	24.46
Cryptogams	-	0	0	0
Bare Ground	211	.25	2.75	7.08

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 08, Facer Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.6	71.6 (15.6)	6.8	53.7	24.0	22.3	2.7	19.8	256.0	.5



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 8

Type	Quadrat Frequency '96
Rabbit	3

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 8

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata tridentata																		
S	84	92	-	-	-	-	-	-	-	-	92	-	-	-	6133			92
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	2	3	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	23	-	-	7	-	-	-	-	-	27	-	3	-	2000			30
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	8	8	-	-	-	-	-	-	16	-	-	-	1066	48	55	16
	90	16	4	-	1	1	-	-	-	-	22	-	-	-	1466	39	29	22
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	1	2	8	-	-	-	-	-	-	9	-	2	-	733			11
	90	10	1	-	-	-	-	-	-	-	8	-	2	1	733			11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	41%	50%	06%	+49%
'90	10%	00%	10%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'84	2132	Dec:		34%
	'90	4199			17%
	'96	0			0%

Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	23	-	-	-	-	-	-	-	-	23	-	-	-	1533			23
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	10	-	-	-	-	-	1	-	-	11	-	-	-	733			11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	26	-	-	-	-	-	-	-	-	26	-	-	-	1733	24	20	26
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	5	-	-	1	-	-	-	-	-	6	-	-	-	400			6
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	2040			102

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'84	0	Dec:		0%
	'90	2866			14%
	'96	0			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	31	21	3
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	37	26	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	3	-	-	1	-	-	-	-	-	3	-	1	-	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+57%
'90	00%	00%	14%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	200	Dec:		0%
'90	465			57%
'96	0			0%

Gutierrezia sarothrae																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	14	-	-	-	-	-	-	-	-	14	-	-	-	933			14
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	33	-	-	-	-	-	-	-	-	33	-	-	-	2200	16	14	33
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	800	13	10	12
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	9	-	-	-	-	-	-	-	-	8	-	-	1	600			9
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-55%
'90	00%	00%	05%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	3133	Dec:		0%
'90	1400			43%
'96	0			0%

Trend Study 3-9-01

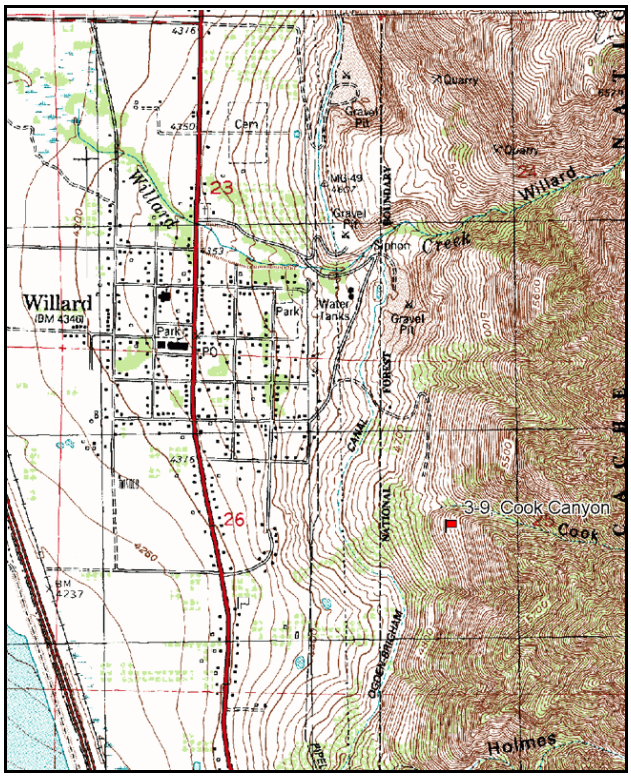
Study site name: Cook Canyon . Vegetation type: Big Sagebrush-Grass .

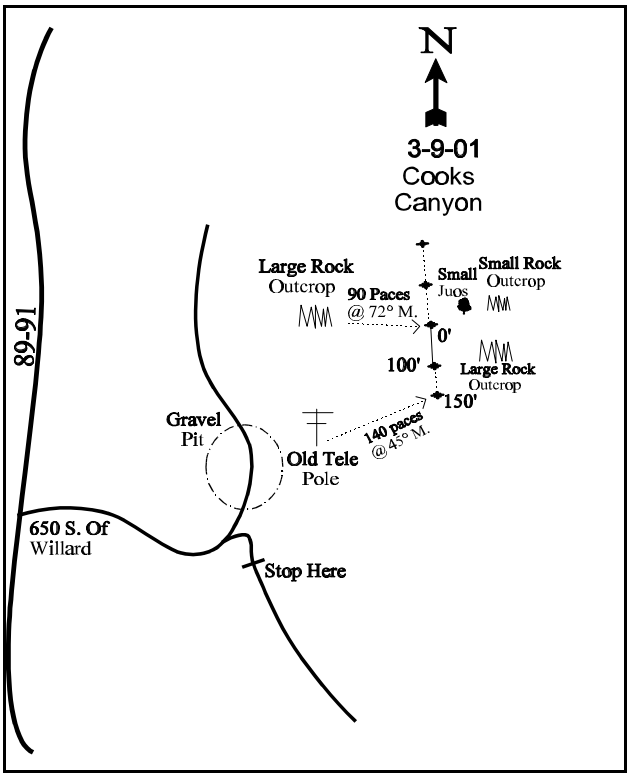
Compass bearing: frequency baseline 162 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft & 71 ft.), line 3 (59ft).

LOCATION DESCRIPTION

From the intersection of US-89/91 in Brigham City, proceed south 6.6 miles on US 89. Turn left (east) on 700 South (south of Willard) and go 0.6 miles to a gravel pit and the Ogden/Brigham Canal. From the point where the canal goes underground, take an azimuth of 30 degrees magnetic and walk approximately ¼ mile up the steep slope to a large rock outcrop. From the rock outcrop, take an azimuth of 87 degrees magnetic and walk 91 paces to the 0-foot stake of the frequency baseline, marked with a browse tag #7924.
Alternate route: Drive along canal road from White's Orchard to a gravel pit. Park here and walk up the slope at a bearing of 65 degrees magnetic for 1/4 mile. The 0-ft post is between two large rock outcrops.





Map Name: Willard

Diagrammatic Sketch

Township 8N , Range 2W , Section 25

UTM 4583504 N 414655 E

DISCUSSION

Trend Study No. 3-9

The Cook Canyon study is situated on a west-facing slope at 4,760 feet elevation, just south of Cook Canyon. The plant community is a mountain big sagebrush type with scattered white rubber rabbitbrush. It also contains widely scattered Utah juniper and Gambel oak clones. A sparse understory consists of warm season perennial grasses, annual grasses, and a few broadleaf weeds. The 35% to 45% slope is steep enough to contribute to some soil instability and erosion. Deer pellet groups occurred frequently in 1984, overall browse utilization was relatively heavy, suggesting that the area was an important wintering site through the critical winters of 1983-84. Two winter killed carcasses from those winters were found nearby. Deer use on available browse has been light from 1990-2001. Deer pellet groups had a quadrat frequency of only 8% in 1996 and 4% in 2001. Pellet group transect data taken in 2001 estimated 2 deer days use/acre (5 ddu/ha). No elk pellets have been sampled in any year.

The soil is "Wasatch Cobbly Sandy Loam" with a gravelly subsoil. The surface layer averages 17 inches in thickness, but is underlain by a highly permeable subsoil extending to below five feet in depth. Drainage is excessive and water holding capacity is poor. During the mid-summer period, the top 35 to 40 inches are often completely dry. The erosion hazard for this soil is moderate (Chadwick et al. 1975). The study site is very rocky and has incomplete plant cover. Soil at the site has a sandy loam texture with a soil reaction that is moderately acidic (6.0 pH). The soil is rocky with abundant gravel throughout the profile. Effective rooting depth was estimated at under 9 inches in 1996. Soil temperature is high, averaging 75.6° F at a depth of 10 inches. In 1996, erosion was moderate as evidenced by the prevalence of erosion pavement, gullies, rills and plant pedestaling. In 2001, erosion seemed to be more stabilized.

The key browse species is mountain big sagebrush. Other shrubs include a small population of broom snakeweed, an occasional mature white rubber rabbitbrush, a few junipers, and isolated patches of Gambel oak and bigtooth maple. During the initial reading in 1984, the mountain big sagebrush stand seemed rather sparse and slightly decadent. However, closer examination revealed the presence of abundant seedlings (5,800 per acre). The previous two or three years (1981-82) must have been highly favorable for seedling establishment. This same trend was apparent at several other locations along the front. Although, apparently few of the seedlings encountered in 1984 survived. During the 1990 reading, population density remained similar to 1984 estimates (2,399 and 2,599 plants/acre) with only a slight increase in young plants. Utilization was light and decadence relatively low at 21%. By 1996, population density declined slightly yet the number of mature plants was similar at 1,460 plants/acre. The largest decline came from the decadent age class which fell from 533 plants/acre to only 180 plants/acre. As a result, percent decadency declined to only 9%. Utilization was light and vigor normal. Seed production was extremely good in 1996. Percent decadency increased in 2001 to 29%, with 50% of this age class classified as dying. This points to a possible die-off in the future. Recruitment was low in 2001, and the average number of young plants since site establishment is not adequate to replace the number of dead, decadent and dying plants within the population. Plants displaying poor vigor also increased in 2001 to 21%. The extended drought, coupled with high competition from annual species in the understory, is most likely the cause of the negative parameters for sagebrush. Annual growth on sagebrush was relatively low in 2001 at less than 2 inches.

Like many sites along the front, the herbaceous understory on this site is dominated by annuals and weedy perennial forbs. Annual brome species and rattail fescue combine to produce 87% of the grass cover in 1996, declining to 56% in 2001. Cheatgrass and rattail fescue both decreased significantly in nested frequency in 2001, most likely due to drought. However, they are still abundant enough to pose a fire hazard, especially in years with normal or above-normal precipitation. Moderately abundant perennial species include Sandberg bluegrass, bluebunch wheatgrass, bulbous bluegrass and purple three-awn (a warm season increaser). As a

group, perennial grasses more than doubled in sum of nested frequency in 2001. Forbs are fairly diverse yet produce less than 10% of the total vegetative cover on the site. Annual forbs increased dramatically in both frequency and cover in 2001. The most common perennial species are dyers woad, Louisiana sagebrush, wild onion and fleabane.

1984 APPARENT TREND ASSESSMENT

This site appears to have an unacceptable rate of soil erosion and for this reason, soil trend appears to be declining. Plant composition may be at a turning point. The established mountain big sagebrush community appears decadent but could be rejuvenated by a large population of seedlings. If these succeed, they will ensure the continued dominance of big sagebrush. Herbaceous composition is somewhat depleted but seems relatively stable.

1990 TREND ASSESSMENT

Trend for big sagebrush is stable. Seedlings made up 71% of the population in 1984. In 1990, the stand is dominated by a slightly increased density of mature shrubs. The number of decadent plants declined while the number of young increased. Sagebrush canopy cover was estimated at 14%. The understory is largely cheatgrass, but there is a significant amount of Sandberg bluegrass, three-awn and bluebunch wheatgrass. Sum of nested frequency for perennial grasses and forbs increased since 1984, yet composition is still poor.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up slightly but poor composition (4)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 7% to 1%. However, some erosion is still occurring even though herbaceous vegetation and litter cover is abundant and well dispersed. Trend for sagebrush is stable. Total density has declined slightly but the decrease comes primarily from the decadent age class. Utilization is light, vigor normal and percent decadence low at 9%. Trend for the herbaceous understory is down. Composition is poor and sum of nested frequency for perennial grasses has declined by 58%. Currently, annual grasses account for 87% of the grass cover. Forbs are limited and dominated by annuals and weedy species.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - down (1)

2001 TREND ASSESSMENT

Trend for soil is stable. Ground cover characteristics remain similar to 1996 levels. Bare ground is almost non-existent and protective cover from vegetation and litter are well dispersed. Trend for browse is slightly down. Mountain big sagebrush remains at a stable density, but percent decadency and poor vigor both increased. The number of decadent plants classified as dying also increased to 50%. These negative parameters are likely drought related and could improve with better precipitation in the future. The proportion of young plants is not adequate to replace the dead and decadent, dying individuals in the population. Trend for the herbaceous understory is slightly up. Sum of nested frequency for perennial grasses

doubled, while that of annual grasses decreased by 24%. Annual forbs did increase in frequency and cover, but forbs only provide 14% of the total herbaceous cover. The increase in perennial grass frequency outweighs the increase in annual forbs.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 9

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	ab18	b37	a15	b42	11	14	6	18	.81	1.88
G	Aristida purpurea	c208	c184	b76	a39	76	70	31	14	2.40	1.23
G	Bromus japonicus (a)	-	-	8	-	-	-	2	-	.18	-
G	Bromus tectorum (a)	-	-	b350	a286	-	-	97	89	23.83	15.73
G	Festuca myuros (a)	-	-	b145	a95	-	-	52	36	2.98	1.96
G	Poa bulbosa	ab2	a-	b9	c72	1	-	6	26	.13	3.63
G	Poa secunda	a27	b130	a37	b151	13	61	20	54	.53	6.96
G	Sporobolus cryptandrus	7	5	13	3	4	3	6	2	.18	.21
Total for Annual Grasses		0	0	503	381	0	0	151	125	27.00	17.70
Total for Perennial Grasses		262	356	150	307	105	148	69	114	4.06	13.93
Total for Grasses		262	356	653	688	105	148	220	239	31.06	31.63
F	Achillea millefolium	-	-	3	3	-	-	1	1	.00	.18
F	Alyssum alyssoides (a)	-	-	-	5	-	-	-	2	-	.03
F	Allium spp.	a-	a-	a-	b35	-	-	-	21	-	.23
F	Arabis spp.	-	-	-	8	-	-	-	3	-	.01
F	Artemisia ludoviciana	a6	ab15	b25	ab9	3	6	12	4	.73	.21
F	Collomia linearis (a)	-	-	-	2	-	-	-	2	-	.01
F	Collinsia parviflora (a)	-	-	a2	b31	-	-	1	12	.00	.23
F	Descurainia pinnata (a)	-	-	-	7	-	-	-	3	-	.09
F	Draba spp. (a)	-	-	a-	b141	-	-	-	49	-	.66
F	Epilobium brachycarpum (a)	-	-	22	10	-	-	10	4	.10	.04
F	Erodium cicutarium (a)	-	-	a7	b57	-	-	3	26	.01	1.20
F	Erigeron spp.	-	-	b16	a2	-	-	7	2	.66	.04
F	Eriogonum spp.	-	-	-	1	-	-	-	1	-	.00
F	Euphorbia spp.	a-	a-	b14	a-	-	-	6	-	.22	-
F	Galium aparine (a)	-	-	a-	b7	-	-	-	5	-	.05
F	Helianthus annuus (a)	-	b5	a-	a-	-	5	-	-	.00	-

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Holosteum umbellatum (a)	-	-	$_{a}$5	$_{b}$137	-	-	2	48	.01	1.02
F	Isatis tinctoria	$_{a}$-	$_{b}$13	$_{c}$33	$_{bc}$21	-	7	16	11	.37	.11
F	Lactuca serriola	-	-	-	1	-	-	-	1	.00	.00
F	Machaeranthera canescens	-	-	-	5	-	-	-	3	-	.18
F	Microsteris gracilis (a)	-	-	4	6	-	-	2	2	.01	.03
F	Phlox longifolia	$_{a}$-	$_{ab}$11	$_{a}$7	$_{b}$15	-	5	2	9	.01	.46
F	Polygonum douglasii (a)	-	-	-	1	-	-	-	1	-	.00
F	Senecio multilobatus	-	-	4	-	-	-	2	-	.06	-
F	Sisymbrium altissimum (a)	-	-	1	-	-	-	1	-	.00	-
F	Tragopogon dubius	7	-	2	9	4	-	1	3	.00	.06
F	Unknown forb-perennial	-	-	-	4	-	-	-	2	-	.30
Total for Annual Forbs		0	5	41	404	0	5	19	154	0.15	3.40
Total for Perennial Forbs		13	39	104	113	7	18	47	61	2.09	1.81
Total for Forbs		13	44	145	517	7	23	66	215	2.24	5.22

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	64	69	19.13	18.40
B	Chrysothamnus nauseosus albicaulis	3	0	.15	-
B	Chrysothamnus viscidiflorus viscidiflorus			.00	.03
B	Gutierrezia sarothrae	7	9	.96	.53
B	Juniperus osteosperma	0	4	-	2.14
B	Opuntia spp.	0	1	-	-
B	Quercus gambelii	1	2	.63	-
B	Unknown browse	0	2	-	-
Total for Browse		75	87	20.88	21.11

CANOPY COVER --
Herd unit 03 , Study no: 9

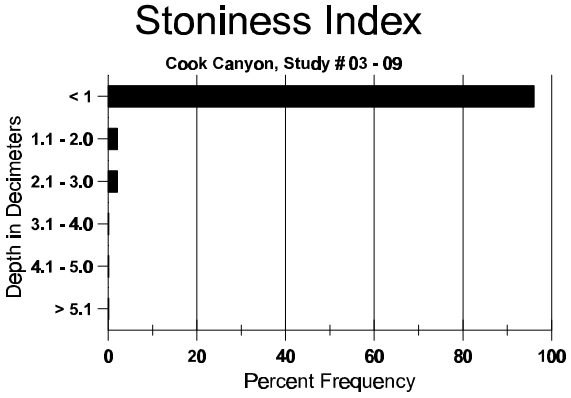
Species	Percent Cover '01
Juniperus osteosperma	2
Quercus gambelii	2

BASIC COVER --
Herd unit 03 , Study no: 9

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	364	366	2.25	17.00	53.98	59.46
Rock	230	235	20.50	14.25	21.08	23.55
Pavement	77	75	8.50	5.50	.55	1.67
Litter	375	352	66.50	56.25	47.18	37.92
Cryptogams	35	54	.25	.50	.50	1.11
Bare Ground	88	77	2.00	6.50	.85	.91

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 09, Cook Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
8.9	75.6 (10.1)	6.0	54.7	26.0	19.3	1.8	13.5	131.2	.4



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 9

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	⍰01	⍰01
Rabbit	4	1	-	-
Deer	8	4	26	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 9

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	87	-	-	-	-	-	-	-	-	87	-	-	-	5800			87
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	1	-	1	-	-	-	-	-	-	2	-	-	-	133			2
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260			13
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	84	-	1	21	-	-	-	-	-	-	22	-	-	-	1466	23	39	22
	90	25	-	-	-	-	-	-	-	-	25	-	-	-	1666	24	32	25
	96	71	2	-	-	-	-	-	-	-	73	-	-	-	1460	27	47	73
	01	65	6	-	-	-	-	-	-	-	68	-	3	-	1420	29	42	71
D	84	-	1	11	-	-	-	-	-	-	9	1	2	-	800			12
	90	8	-	-	-	-	-	-	-	-	-	3	3	2	533			8
	96	7	2	-	-	-	-	-	-	-	8	-	-	1	180			9
	01	26	4	-	-	-	-	-	-	-	11	-	4	15	600			30
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	520			26
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	440			22

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	06%	92%	06%	+ 8%
'90	00%	00%	13%	-27%
'96	04%	00%	01%	+10%
'01	10%	00%	21%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	2399	Dec:	33%
	'90	2599		21%
	'96	1900		9%
	'01	2100		29%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus albicaulis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	21	22	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	25	31	1
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	38	63	2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	43	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+ 0%
'90	00%	00%	00%	- 9%
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	66	Dec:		-
'90	66			-
'96	60			-
'01	0			-

Gutierrezia sarothrae																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	32	-	-	-	-	-	-	-	-	32	-	-	-	2133	15	14	32
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	800	10	11	12
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	14	20	11
	01	13	-	-	1	-	-	-	-	-	14	-	-	-	280	12	18	14
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	-62%
'90	00%	00%	00%	-73%
'96	00%	00%	00%	+31%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	2133	Dec:	-
'90	800		-
'96	220		-
'01	320		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	2280	-	-	114

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'84	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%
'01	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	2280		-

Opuntia spp.																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	19	0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	12	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'84	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%
'01	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
	01	5	-	-	-	-	-	-	-	-	5	-	-	-	100	-	-	5
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+40%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	60			-
'01	100			-

Unknown browse																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	48	75	0
	01	-	-	-	2	-	-	-	-	-	2	-	-	-	40	21	68	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	-
'90	0		-
'96	0		-
'01	40		-

*****Suspended*****

Trend Study 3-10-96

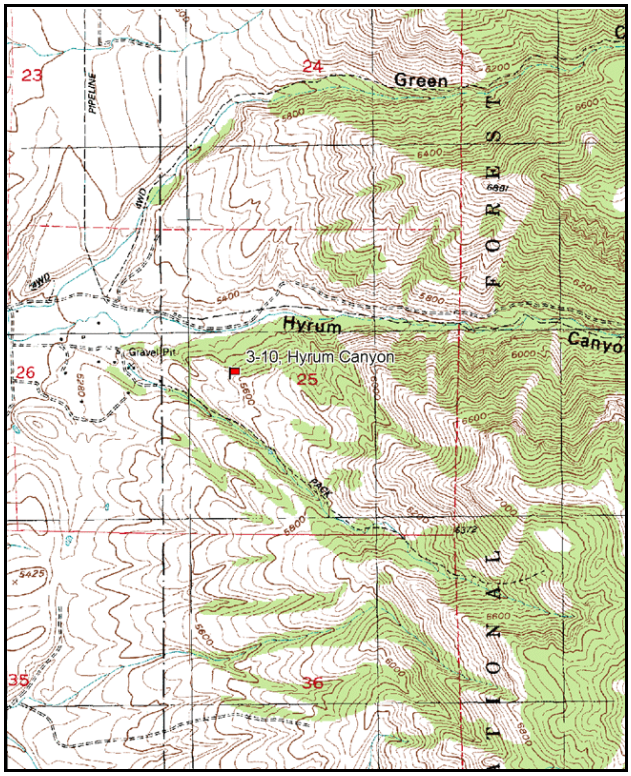
Study site name: Hyrum Canyon . Vegetation type: Big Sagebrush-Grass .

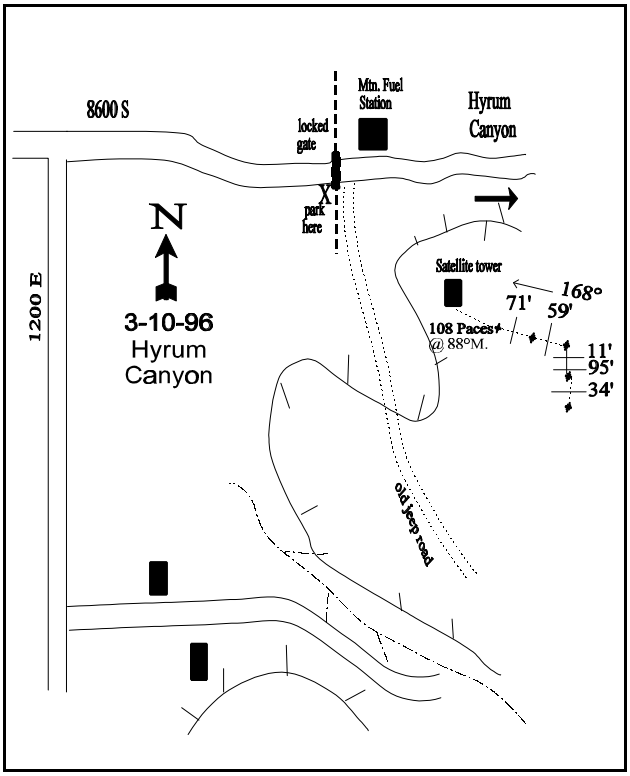
Compass bearing: frequency baseline 146 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Drive east from the town of Paradise to the intersection of 1200 East and 8600 South. Continue east towards Hyrum Canyon for 0.5 miles to a Mountain Fuel station and a locked gate. Park here and walk approximately ½ mile southeast up on the sagebrush bench to a satellite receiving tower. From this reflector walk 155 paces at a bearing of 90 degrees magnetic to the 0-foot baseline stake, located by a small maple. This stake is marked by browse tag #7981. Lines three and four are run off the 0-foot stake at a bearing of 348 degrees magnetic.





Map Name: Paradise

Diagrammatic Sketch

Township 10N , Range 1E , Section 25

UTM 4602730 N 434220 E

DISCUSSION

Trend Study No. 3-10

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This study was not read in 2001 due to access problems. Text and data tables are included from the 1996 report.

The Hyrum Canyon study samples a mountain big sagebrush-grass community located east of Paradise at an elevation of 5,560 feet. The area is considered critical deer winter range. It has a moderate slope (15%) and a southwest aspect. This area supports a dense and vigorous stand of mountain big sagebrush that has sustained moderate to heavy use from deer, domestic sheep, horses and cattle in the past. Currently ('96), there were no signs of domestic grazing or any wildlife pellet groups. Understory composition has been unfavorably influenced by past heavy grazing practices.

Soil is "Nebeker Silt Loam," an alluvially deposited, well-drained soil derived from sandstone, quartzite and shale. This soil is moderately deep and slightly acidic but becomes increasingly clayey and calcareous at depths greater than four feet. Water holding capability, permeability and erosion hazard are all moderate. Dry farmed cropland is a principal use of Nebeker soil (Erickson and Mortensen 1974). Sampled soils at the site have a clay loam texture with a slightly acid soil reaction (6.4 pH). Effective rooting depth (see methods) is estimated at nearly 16 inches. Due to the gentle slope and good plant cover, the site shows few signs of erosion. Organic matter is moderately high at over 4%.

Browse composition consists almost exclusively of mountain big sagebrush. Vigor, even of decadent plants, is good. Population density has remained fairly stable at around 3,000 plants/acre since 1984. Utilization was heavy in 1984, but mostly light in 1990 and 1996. Percent decadence was moderately low in 1996 at 15%. Seedlings were extremely abundant in 1990 (14,466 per acre) but none were encountered in 1996. Some of the difference in the number of seedlings is likely due to the greatly increased sample used in 1996 which better estimates shrub populations with clumped and/or discontinuous distributions. Also, the abundant herbaceous understory and prolonged drought have likely combined to reduce seedling establishment and survival.

The understory has been depleted as a result of past sheep, cattle and horse use. Although perennial grasses are present, they are inferior in both numbers and production to invader and increaser forbs and annual grasses. Annual grasses consisting of Japanese brome and cheatgrass provide 91% of the grass cover in 1996. Perennial grasses include Kentucky bluegrass, Sandberg bluegrass, bluebunch wheatgrass, slender wheatgrass and bulbous bluegrass. Forbs are diverse and abundant, producing nearly as much cover as the grasses. Desirable perennial and biennial forbs are rare however. Among the less desirable forbs are curlycup gumweed, autumn willowweed, ragweed, annual sunflower, dyers woad, tarweed and spreading fleabane daisy.

1984 APPARENT TREND ASSESSMENT

Soil is deep and fertile and shows few signs of serious erosion in spite of some trampling and compaction by livestock. Trend appears stable. Vegetative trend also appears stable with respect to the key browse species but slightly down for understory composition.

1990 TREND ASSESSMENT

Mountain big sagebrush has excellent vigor, good reproduction and light hedging. From a population that was classified as 44% decadent yet stable in 1984, sagebrush values for density have increased slightly. The dense and healthy understory of Kentucky bluegrass increased in frequency. However, annual and weedy increaser species are abundant. Vegetative cover increased and the percentage of bare soil decreased to 9%.

TREND ASSESSMENT
soil - slightly up (4)
browse - up for the key species, mountain big sagebrush (5)
herbaceous understory - slightly downward because of the large quantities of weedy increaser species and annuals (2)

1996 TREND ASSESSMENT

The soil trend is up due to a notable decline in bare ground (8% to 1%) and a large increase in litter cover (55% to 80%). Vegetation and litter cover are very abundant and almost completely cover the ground surface. No erosion is evident. Trend for sagebrush is stable. It appears that the sagebrush population has reached its density limit. Most plants appear unutilized and vigorous with abundant seed production. Percent decadence is moderately low at 15%. The herbaceous understory is very abundant producing nearly 50% average cover. The herbaceous cover is split nearly equal between grasses and forbs. Unfortunately, 91% of the grass cover comes from annual brome grasses (Japanese brome and cheatgrass). Sum of nested frequency for the most common perennial grass in 1990, Kentucky bluegrass, has declined by 72%. It currently has a quadrat frequency of only 15%. Forbs are diverse and productive, yet the composition is extremely poor. The most common perennial species would include willowweed, curlycup gumweed, tarweed, Louisiana sage, western yarrow, dyers woad, prickly lettuce and yellow salsify. Sum of nested frequency for perennial grasses has declined, while sum of nested frequency for perennial forbs has remained similar. Trend is considered down.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - down with an extremely poor composition (1)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron intermedium	-	12	-	-	4	-	-
G	Agropyron spicatum	11	7	9	4	3	4	.19
G	Agropyron trachycaulum	a-	a2	b15	-	2	7	.80
G	Bromus japonicus (a)	-	-	359	-	-	99	22.79
G	Bromus tectorum (a)	-	-	55	-	-	19	2.61
G	Poa bulbosa	a-	b24	a5	-	9	3	.04
G	Poa pratensis	b104	b130	a37	45	53	15	1.18
G	Poa secunda	a-	b10	b17	-	5	10	.27
Total for Annual Grasses		0	0	414	0	0	118	25.40
Total for Perennial Grasses		115	185	83	49	76	39	2.50
Total for Grasses		115	185	497	49	76	157	27.90
F	Achillea millefolium	60	71	76	21	27	30	2.12
F	Agoseris glauca	ab6	b13	a-	3	5	-	-
F	Alyssum alyssoides (a)	-	-	10	-	-	4	.02
F	Artemisia ludoviciana	17	17	11	5	5	4	1.31
F	Cirsium spp.	-	3	-	-	2	-	-
F	Collomia linearis (a)	-	-	1	-	-	1	.00
F	Collinsia parviflora (a)	-	-	8	-	-	3	.04
F	Cryptantha spp.	a-	a-	b42	-	-	17	.50
F	Descurainia pinnata (a)	-	-	5	-	-	2	.01
F	Epilobium brachycarpum (a)	-	-	225	-	-	79	8.24
F	Erigeron spp.	-	-	2	-	-	2	.33
F	Galium aparine (a)	-	-	72	-	-	30	.93
F	Gilia aggregata	-	6	-	-	4	-	-
F	Grindelia squarrosa	ab98	b125	a72	37	53	28	4.13
F	Hackelia patens	a20	b39	ab34	10	21	18	.54
F	Holosteum umbellatum (a)	-	-	3	-	-	1	.00
F	Isatis tinctoria	a-	a-	b34	-	-	17	.89
F	Lappula occidentalis (a)	-	-	14	-	-	6	.05
F	Lactuca serriola	a-	a-	b50	-	-	22	.71
F	Lupinus caudatus	-	1	-	-	1	-	-
F	Madia glomerata (a)	-	-	15	-	-	8	.09
F	Microsteris gracilis (a)	-	-	4	-	-	2	.01
F	Penstemon spp.	-	-	2	-	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
F	Phlox longifolia	-	-	3	-	-	1	.00
F	Polygonum douglasii (a)	-	-	45	-	-	18	.21
F	Taraxacum officinale	-	4	-	-	2	-	-
F	Tragopogon dubius	40	42	37	24	23	17	.55
F	Unknown forb-perennial	-	8	-	-	6	-	-
F	Veronica biloba (a)	-	-	7	-	-	2	.03
F	Viola spp.	-	11	-	-	4	-	-
F	Zigadenus paniculatus	-	-	5	-	-	3	.01
Total for Annual Forbs		0	0	409	0	0	156	9.66
Total for Perennial Forbs		241	340	368	100	153	160	11.12
Total for Forbs		241	340	777	100	153	316	20.79

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 10

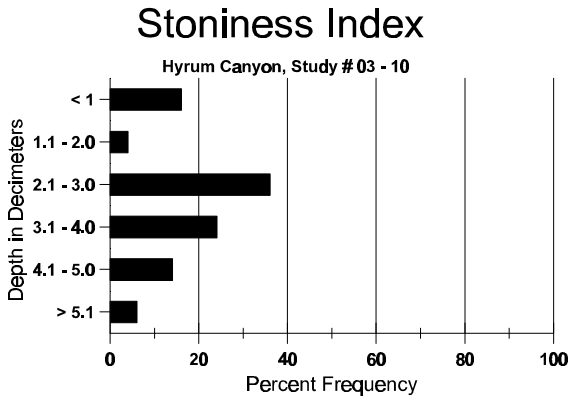
Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Acer grandidentatum	1	.03
B	Artemisia tridentata vaseyana	91	24.34
B	Gutierrezia sarothrae	1	.15
B	Juniperus scopulorum	1	.85
Total for Browse		94	25.37

BASIC COVER --
Herd unit 03 , Study no: 10

Cover Type	Nested Frequency	Average Cover %		
	'96	'84	'90	'96
Vegetation	383	2.25	35.50	62.45
Rock	41	0	0	.20
Pavement	44	1.00	.75	.18
Litter	399	82.50	55.25	79.99
Cryptogams	3	.25	0	.00
Bare Ground	60	14.00	8.50	1.22

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 10, Hyrum Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.5	58.6 (17.4)	6.4	27.9	36.1	36.0	4.5	23.6	262.4	.6



BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 10

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Acer grandidentatum																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	34	26	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	00%	+ 0%
'90	00%	100%	00%	-70%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	66	Dec:	-
	'90	66		-
	'96	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	187	-	-	30	-	-	-	-	-	217	-	-	-	14466			217
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	11	1	-	1	-	-	-	-	-	13	-	-	-	866			13
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	84	4	8	11	-	-	-	-	-	-	23	-	-	-	1533	19	17	23
	90	28	4	2	-	-	-	-	-	-	31	1	2	-	2266	22	24	34
	96	116	-	-	-	-	-	-	-	-	116	-	-	-	2320	28	40	116
D	84	-	7	13	-	-	-	-	-	-	20	-	-	-	1333			20
	90	2	1	-	-	-	-	-	-	-	3	-	-	-	200			3
	96	21	2	-	-	-	-	-	-	-	23	-	-	-	460			23
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1080			54

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	38%	53%	00%	+10%
'90	12%	04%	04%	- 8%
'96	01%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	2999	Dec:		44%
'90	3332			6%
'96	3060			15%

Chrysothamnus viscidiflorus stenophyllus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	27	54	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	0			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12	15	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	20			-

Juniperus scopulorum																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	20			-

Trend Study 3-12-01

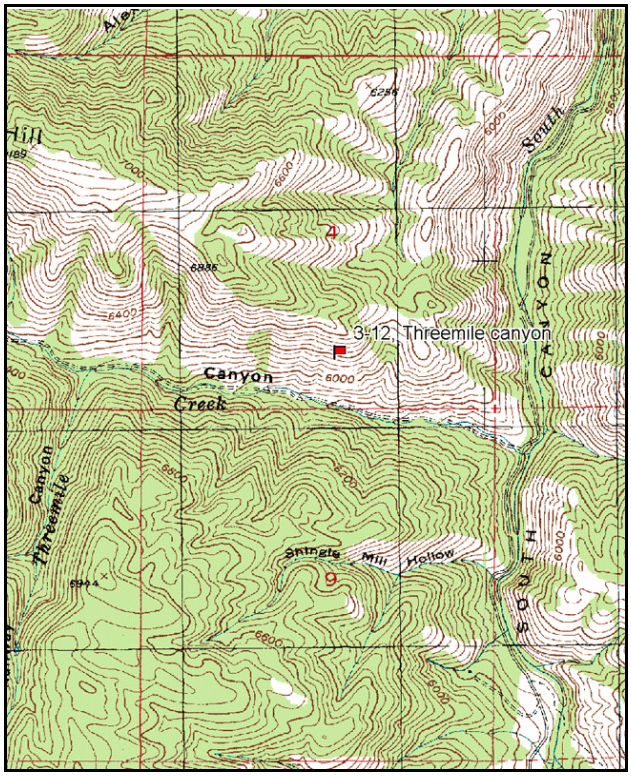
Study site name: Threemile Canyon . Vegetation type: Bitterbrush .

Compass bearing: frequency baseline 159 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 3 ft.

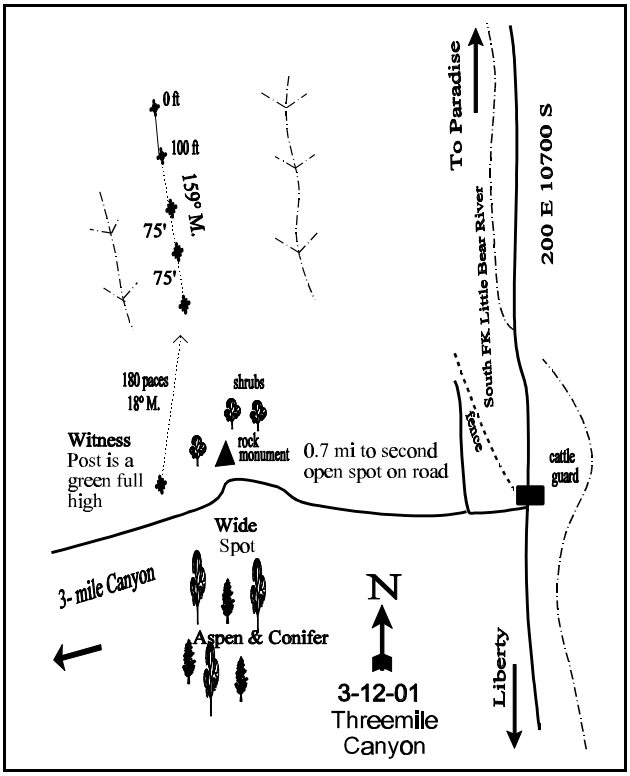
LOCATION DESCRIPTION

From 200 East and 10700 South in Avon, proceed south (towards Liberty) on a dirt road for 7.0 miles. Cross the cattle guard and turn immediately right (west). Travel. 0.7 miles up Three-mile Canyon and stop adjacent to a green and white witness post on the right side of road. Walk 180 paces at 18 degrees magnetic from the witness post to the last baseline stake. From the last baseline stake to the 0-foot baseline stake walk 400 feet at an azimuth 340 degrees magnetic. The 0-foot stake is marked by browse tag #7982.



Map Name: James Peak

Township 8N , Range 1E , Section 4



Diagrammatic Sketch

UTM 4589284 N 429627 E

DISCUSSION

Trend Study No. 3-12

The Three-Mile Canyon study samples a sparse but heavily used mixed bitterbrush/sagebrush community in Three-mile Canyon, a tributary of the South Fork of the Little Bear River. The area is on a very steep (60%), south facing slope at an elevation of about 6,120 feet. Winter deer use can be heavy during average as well as severe winters. Use of the available browse was very heavy in 1984 and moderately heavy in 1990. Deer use was light in 1996 and 2001. Elk use was very light. Pellet group transect data taken in 2001 estimated 26 deer days use/acre (65 ddu/ha) and 2 elk days use/acre (5 edu/ha).

Soil is classified as "Sheep Creek Cobbly Loam", a soil series that is very cobbly throughout becoming more clayey in the subsoil. Drainage is excellent with moderate permeability and very rapid runoff potential. Although the soil has a high erosion hazard, an erosion condition class assessment done in 2001 shows the soil to be stable with little erosion shown at that time. This soil is only moderately deep (28-40 inches to fractured limestone bedrock) and often has a calcareous accumulation at approximately 22 inches depth. Surface horizons range from neutral to slightly alkaline (Erickson and Mortensen 1974). Sampled soils on the site have a clay loam texture with a neutral soil reaction (7.2 pH). Effective rooting depth (see methods) was estimated at 16 inches in 1996. Rocks are common on the surface and within the profile. Soil temperature is relatively high at 67°F at an average depth of 16 inches. Vegetation and litter cover are abundant and well dispersed.

Browse composition consists of a moderate stand of antelope bitterbrush interspersed with a low density mountain big sagebrush. Small amounts of mountain snowberry, Wood's rose and serviceberry are also present on or around the site. The key species, bitterbrush, had an estimated density of 820 plants/acre in 1996, decreasing slightly to 700 plants/acre in 2001. Density estimates are higher since 1990 due to a much better estimate given by the greatly enlarged sample used in 1996 and 2001. The entire population displayed heavy use in 1984, with use decreasing to a more moderate level since then. Percent decadence was quite high at over 40% in 1984 and 1990. However, percent decadence has declined considerably, 5% in 1996 and 17% in 2001. Recruitment from young plants was low in 2001. The average number of young in the population since site establishment has not been adequate to replace the dead within the population. Vigor remains normal throughout the population. Average leader growth on bitterbrush was about 4 inches in 2001.

Mountain big sagebrush density has steadily declined with each reading. Much of the decline is the result of the change in sample size since 1996, giving a much better estimate of shrub populations. Currently ('01), an estimated 100 mountain big sagebrush plants/acre occur on the site. Utilization was heavy in 1984, but use has steadily decreased and is currently light. Percent decadence has ranged from 40-50% in all sampling years. Recruitment by young plants into the population remains low. The average number of young plants since 1984 has not been adequate to replace the dead within the population.

The herbaceous understory is dominated by the annual grasses, cheatgrass and Japanese brome, which account for over 70% of the grass cover in 1996 and 2001. Desired perennial species such as bluebunch wheatgrass, Sandberg bluegrass and Great Basin wildrye are also present. They have maintained fairly stable frequencies between 1996 and 2001. However, these species combined only provide about one-forth of the grass cover in 2001. As with several other studies in this unit in 2001, bulbous bluegrass a less desirable perennial, has significantly increased on this site. Forbs can be found in fairly large numbers but are mainly low growing and/or increaser species which include Louisiana sagebrush, yellow salsify and prickly lettuce. Arrowleaf balsamroot is perhaps the most desirable forb, but it occurs only occasionally.

1984 APPARENT TREND ASSESSMENT

Considering the high erosion hazard of this soil and the steep slope, soil movement is surprisingly low. Soil trend appears stable. Vegetative trend is more complicated. Although the study samples an area that is obviously important to and favored by wintering deer, the existing stand of browse seems to be declining. Current forage production is good, but certainly not outstanding. An increasing grass cover does not argue well for the future of sagebrush.

1990 TREND ASSESSMENT

Bitterbrush and mountain big sagebrush populations both decreased, 22% and 67% respectively. Together, it indicates a definite downward trend for these key browse species. A moderating factor is that, while in 1984 all the bitterbrush were classified as heavily hedged, in 1990 all form classes were represented, suggesting generally lighter utilization. Bitterbrush canopy cover was estimated at 5%. Sagebrush cover was too low to measure with the variable plot method. A significant decline in nested frequency was noted for bluebunch wheatgrass, and large increased frequency was measured for yellow salsify (*Tragopogon dubius*). Ground cover characteristics are almost unchanged.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - slightly downward, poor composition (2)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 21% to 5% and an increase in percent cover of litter from 41% to 64%. Vegetation and litter cover are abundant and well dispersed. No erosion is evident on the site. Trend for browse is stable but limited. Density of bitterbrush is estimated at 820 plants/acre with the new, much larger sample size. Utilization is mostly moderate and percent decadence low at 5%. Recruitment appears sufficient to maintain the population. Mountain big sagebrush has a density of only 180 plants/acre, providing little forage. It only contributes 5% of the browse cover at this time. Reproduction is limited and likely hindered by the abundant herbaceous understory. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency for perennial grasses. Nested frequency for perennial forbs increased, but the increase came primarily from weedy species.

TREND ASSESSMENT
soil - up (5)
browse - stable overall (3)
herbaceous understory - down slightly and dominated by annuals and weedy perennial forbs (2)

2001 TREND ASSESSMENT

Trend for soil is stable. The abundance of herbaceous vegetation and litter cover effectively limits erosion. Trend for browse is slightly down. Bitterbrush density slightly decreased with a reduction in the number of young plants and percent decadency increased. Decadency in the mountain big sagebrush population remains at a moderately high level (40%). Those classified with poor vigor increased from 0% to 20%. These negative parameters are likely drought related and should improve with normal precipitation in the future. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs remains stable. Annual species are still abundant in the understory, but overall they did not increase in 2001.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 12

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
G	Agropyron spicatum	$_{b}$220	$_{a}$164	$_{a}$120	$_{a}$131	83	70	47	52	4.64	7.90
G	Bromus japonicus (a)	-	-	$_{b}$354	$_{a}$205	-	-	99	65	20.07	8.06
G	Bromus tectorum (a)	-	-	$_{a}$209	$_{b}$276	-	-	66	76	6.28	22.38
G	Carex spp.	-	-	-	3	-	-	-	1	-	.00
G	Elymus cinereus	$_{a}$-	$_{a}$1	$_{b}$22	$_{ab}$13	-	1	7	4	1.63	1.83
G	Poa bulbosa	$_{a}$-	$_{b}$18	$_{b}$11	$_{c}$75	-	9	5	27	.12	1.57
G	Poa secunda	$_{a}$-	$_{b}$32	$_{b}$18	$_{b}$18	-	16	10	9	.20	.20
Total for Annual Grasses		0	0	563	481	0	0	165	141	26.36	30.44
Total for Perennial Grasses		220	215	171	240	83	96	69	93	6.60	11.52
Total for Grasses		220	215	734	721	83	96	234	234	32.96	41.97
F	Achillea millefolium	-	-	6	6	-	-	2	2	.03	.06
F	Agoseris glauca	$_{b}$34	$_{b}$19	$_{a}$5	$_{a}$1	19	11	2	1	.01	.01
F	Allium acuminatum	17	-	-	-	6	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	88	109	-	-	36	46	.30	1.23
F	Artemisia ludoviciana	$_{a}$25	$_{a}$30	$_{a}$29	$_{b}$56	10	10	11	20	.88	3.27
F	Aster chilensis	-	-	1	1	-	-	1	1	.06	.00
F	Balsamorhiza sagittata	14	16	6	14	7	9	2	6	1.75	2.82
F	Camelina microcarpa (a)	-	-	1	5	-	-	1	3	.00	.04
F	Calochortus nuttallii	$_{a}$-	$_{b}$8	$_{a}$-	$_{ab}$2	-	5	-	1	-	.00
F	Cirsium spp.	$_{a}$1	$_{b}$29	$_{a}$13	$_{a}$2	1	15	8	2	.37	.06
F	Collomia linearis (a)	-	-	$_{b}$44	$_{a}$10	-	-	21	4	.18	.02
F	Collinsia parviflora (a)	-	-	3	1	-	-	1	1	.00	.00
F	Crepis acuminata	$_{a}$-	$_{c}$29	$_{b}$21	$_{ab}$6	-	13	9	3	.22	.09
F	Epilobium brachycarpum (a)	-	-	$_{b}$104	$_{a}$18	-	-	40	8	.91	.04
F	Erodium cicutarium (a)	-	-	-	10	-	-	-	6	-	.13
F	Galium aparine (a)	-	-	3	-	-	-	1	-	.03	-
F	Hackelia patens	-	-	-	6	-	-	-	2	-	.06
F	Holosteum umbellatum (a)	-	-	$_{a}$7	$_{b}$77	-	-	4	32	.02	.33
F	Isatis tinctoria	$_{a}$-	$_{ab}$4	$_{ab}$7	$_{b}$16	-	2	4	7	.16	.22
F	Lappula occidentalis (a)	-	-	$_{a}$2	$_{b}$18	-	-	1	7	.00	.06

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'84	'90	'96	'01	'84	'90	'96	'01	'96	'01
F	Lactuca serriola	$_{a}$-	$_{b}$43	$_{c}$99	$_{c}$113	-	21	44	48	1.13	2.82
F	Lesquerella spp.	-	-	-	2	-	-	-	1	-	.00
F	Lithospermum ruderale	-	-	12	6	-	-	4	3	1.06	.45
F	Lomatium grayi	-	1	-	-	-	1	-	-	-	-
F	Polygonum douglasii (a)	-	-	-	1	-	-	-	1	.00	.00
F	Ranunculus testiculatus (a)	-	-	-	3	-	-	-	1	-	.00
F	Senecio multilobatus	$_{b}$41	$_{a}$-	$_{a}$-	$_{a}$2	21	-	-	1	-	.00
F	Tragopogon dubius	$_{a}$32	$_{c}$185	$_{c}$195	$_{b}$76	12	78	80	36	5.07	2.05
F	Unknown forb-perennial	-	-	-	16	-	-	-	7	-	.13
F	Veronica biloba (a)	-	-	21	45	-	-	10	19	.70	.14
Total for Annual Forbs		0	0	273	297	0	0	115	128	2.17	2.01
Total for Perennial Forbs		164	364	394	325	76	165	167	141	10.78	12.09
Total for Forbs		164	364	667	622	76	165	282	269	12.96	14.11

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 12

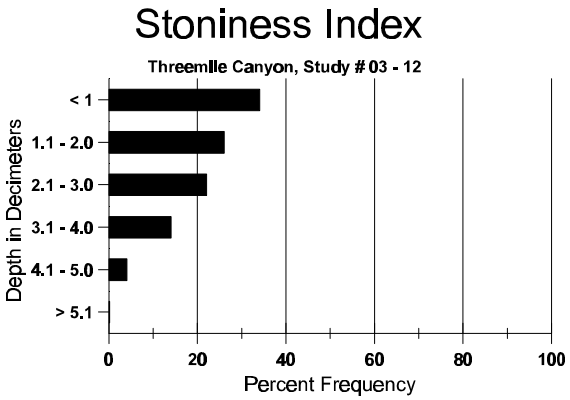
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	8	5	.41	-
B	Mahonia repens	2	2	.15	.03
B	Purshia tridentata	25	27	8.01	7.73
B	Rosa woodsii	5	4	.24	.03
Total for Browse		40	38	8.81	7.79

BASIC COVER --
Herd unit 03 , Study no: 12

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'84	'90	'96	'01
Vegetation	394	380	3.50	9.00	56.96	62.90
Rock	167	150	15.25	12.75	5.47	8.76
Pavement	72	178	10.25	17.00	.50	5.16
Litter	397	357	49.75	40.50	64.06	33.45
Cryptogams	-	-	.75	0	0	0
Bare Ground	146	146	20.50	20.75	4.86	7.33

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 12, Threemile Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.1	67.4 (16.3)	7.2	27.3	40.7	32.0	3.1	15.8	201.6	.6



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 12

Type	Quadrat Frequency	
	'96	'01
Elk	1	-
Deer	5	13
Cattle	-	1

Pellet Transect	
Pellet Groups per Acre ⁄01	Days Use per Acre (ha) ⁄01
26	2 (5)
340	26 (65)
-	-

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 12

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	29	34	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'84	0		-
	'90	0		-
	'96	0		-
	'01	0		-

Artemisia tridentata vaseyana																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	4	13	-	-	-	-	-	-	17	-	-	-	566	26	32	17
	90	1	4	-	-	-	-	-	-	-	5	-	-	-	166	21	17	5
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80	18	22	4
	01	2	-	-	-	-	-	1	-	-	3	-	-	-	60	19	22	3
D	84	-	-	13	-	-	-	-	-	-	13	-	-	-	433			13
	90	1	3	1	-	-	-	-	-	-	2	-	-	3	166			5
	96	1	2	-	1	-	-	-	-	-	4	-	-	-	80			4
	01	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	13%	87%	00%	-67%
'90	70%	10%	30%	-46%
'96	22%	00%	00%	-44%
'01	00%	00%	20%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'84	999		43%
	'90	332		50%
	'96	180		44%
	'01	100		40%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	16	-	-	-	-	-	16	-	-	-	320	6	6	16
	01	9	-	-	12	-	-	-	-	-	21	-	-	-	420	-	-	21

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	+27%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:
'84	0		-
'90	0		-
'96	320		-
'01	440		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	10	-	-	-	-	-	-	10	-	-	-	333	30	48	10
	90	4	2	2	-	-	-	-	-	-	8	-	-	-	266	25	48	8
	96	9	20	5	-	-	-	-	-	-	34	-	-	-	680	32	59	34
	01	11	12	5	-	-	-	-	-	-	28	-	-	-	560	34	57	28
D	84	-	-	8	-	-	-	-	-	-	8	-	-	-	266			8
	90	2	1	3	-	-	-	-	-	-	4	1	-	1	200			6
	96	-	1	-	-	-	1	-	-	-	2	-	-	-	40			2
	01	4	1	1	-	-	-	-	-	-	6	-	-	-	120			6
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	00%	-22%
'90	21%	36%	07%	+43%
'96	51%	15%	00%	-15%
'01	37%	17%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	599	Dec:		44%
'90	466			43%
'96	820			5%
'01	700			17%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	90	33	-	-	-	-	-	-	-	-	33	-	-	-	1100			33
	96	6	2	-	-	-	-	-	-	-	8	-	-	-	160			8
	01	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166	7	4	5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	8	5	-	-	-	-	-	-	-	13	-	-	-	260	12	11	13
	01	10	-	-	-	-	-	-	-	-	10	-	-	-	200	17	12	10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	+70%
'90	00%	00%	00%	-62%
'96	33%	00%	00%	-19%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	332	Dec:		-
'90	1100			-
'96	420			-
'01	340			-

Symphoricarpos oreophilus																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	90	2	1	-	-	-	-	-	-	-	2	1	-	-	100			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	1	1	-	-	-	-	-	-	3	-	-	-	100	18	43	3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	14%	29%	00%	-57%
'90	33%	00%	00%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'84	233	Dec:	14%
'90	100		0%
'96	0		0%
'01	0		0%

*****Suspended*****

Trend Study 3-13-96

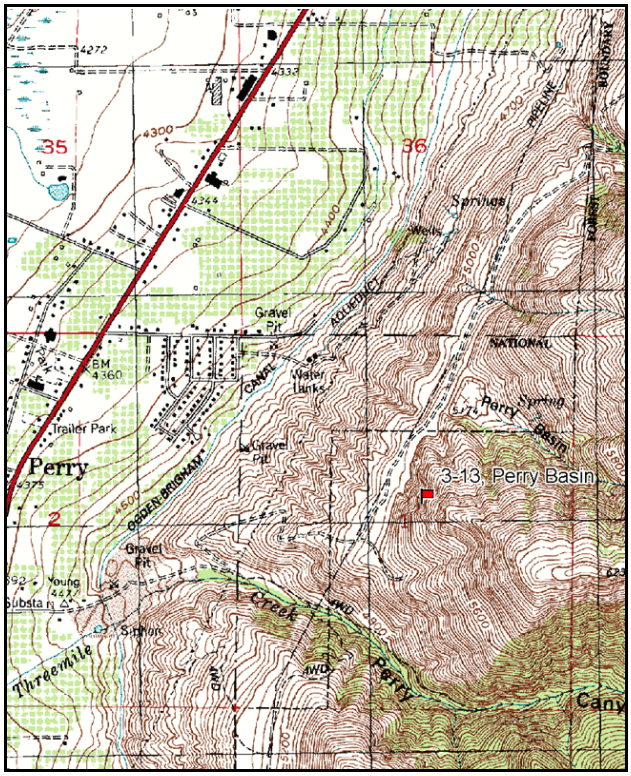
Study site name: Perry Basin . Vegetation type: Big Sagebrush-Grass .

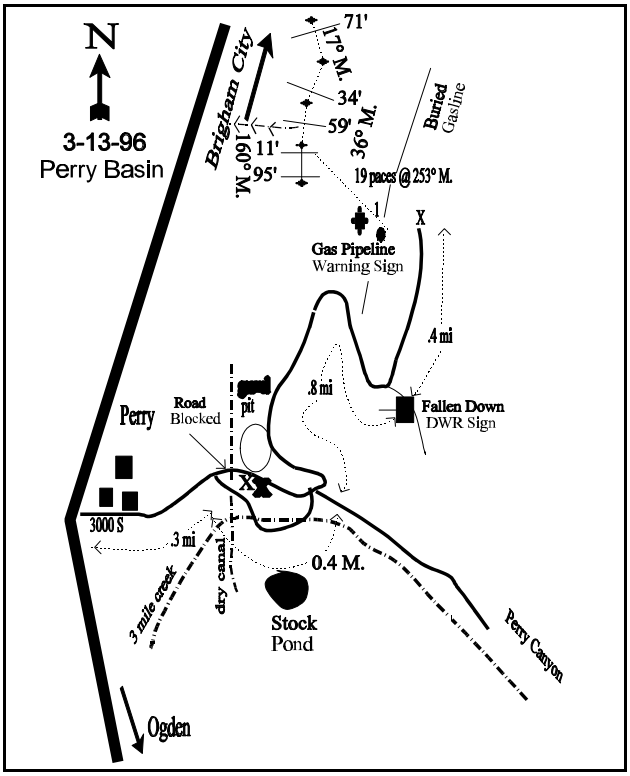
Compass bearing: frequency baseline 160 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From 300 South and Highway 89 in Perry, proceed east towards Perry Basin driving around gravel pit for 0.7 miles and take the left fork. Travel 0.7 miles to another fork, stay to the right (on the main road) and proceed 0.4 miles to Perry Basin. Stop at this point. Perry Basin should be to the east, and a gas pipeline warning sign should be to the west. From the sign, proceed 19 paces at 253 degrees magnetic to the 100-foot stake of the baseline. The 0-foot baseline stake is 100 feet away at 340 degrees magnetic. The stake is marked with browse tag #7994. The rest of the baseline runs off the 0-baseline stake and runs in a northerly direction. Line 2 & 3 run 36 degrees magnetic. Line 4 runs 17 degrees magnetic.





Map Name: Willard

Diagrammatic Sketch

Township 8N , Range 2W , Section 1

UTM 4590804 N 415156 E

DISCUSSION

Trend Study No. 3-13

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site was burned in 1995 and does not appear to have been rehabilitated. All of the key browse, mountain big sagebrush, was lost following the burn. The Project Leader evaluated this site in 2001 and due to the lack of browse and no sign of wildlife use on the site, it was suspended. Text and data tables are included from the 1996 report.

The Perry Basin study samples critical deer winter range located slightly west of Perry Basin on the Brigham City-Willard face. The site is near the lower edge of the upper Lake Bonneville terrace and has a moderate (15%) west- northwest slope. Elevation is approximately 5,100 feet. The range type is classified as mountain big sagebrush/grass. A fire burned the entire area during the summer of 1995 which eliminated essentially all of the browse. Deer use was light to moderate in 1984 and 1990, with no domestic livestock use evident. No big game pellet groups were found during the 1996 reading.

Soil is classed as "Kilburn Gravelly Sandy Loam," a widespread series on lake terraces in this area. All of the Kilburn soils are excessively drained and derived primarily from metamorphic rock. Permeability is rapid with low water holding capability in the upper soil layers. However, potential rooting depth extends to at least 60 inches, a depth at which water is almost always available. Soil reaction is neutral in the upper horizons and mildly alkaline in the deep subsoil. Runoff and erosion hazards range from medium to high depending upon slope steepness (Erickson and Mortensen 1974). Sampled soils at the site were moderately deep with a sandy loam texture and a slightly acid soil reaction (6.3 pH). The soil temperature is moderately high at 69^{o}F at a depth of 18 inches. Small pea-sized gravel covers a considerable amount of the ground surface (45%). Effective rooting depth was estimated at 22 inches in 1996. The gentle terrain and the abundant vegetation cover helps limit erosion. There are some gullies west of the study area on steeper slopes, but they do not appear to be currently active.

Browse composition was previously dominated by a moderately dense and vigorous stand of mountain big sagebrush. With the exception of a small population of broom snakeweed, no other shrub species were present. The sagebrush population consisted of variable sized shrubs ranging from seedlings to larger than average mature plants. Age structure appeared stable and form class distribution suggested moderate to heavy use in 1984, but mostly light use since then. The fire which burned the area during the summer of 1995 eliminated nearly all of the browse on the site. Only a few sagebrush seedlings were sampled, along with a few rubber rabbitbrush and low rabbitbrush plants following the fire.

The herbaceous understory is dominated by forbs and annual grasses. Perennial grasses are represented by Sandberg bluegrass and occasional plants of bluebunch wheatgrass. Annual grasses were abundant enough to pose a significant fire hazard in 1990. After the fire, annual grasses, mostly cheatgrass, Japanese brome, and rattlesnake brome, accounted for 50% of the grass cover. An additional 48% of the grass cover comes from Sandberg bluegrass. The forb composition is diverse yet dominated by annuals and weeds. The most abundant forbs are dyers woad, yellow salsify, flannel mullein, and hoary aster. This site was apparently not seeded after the fire. At this time it has basically lost its usefulness as an important winter range for deer.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be down slightly because of higher than acceptable erosion resulting from an essentially annual understory, that although produces considerable litter, still allows excessive overland flows of water. Vegetative trend appears stable for the key browse species but down for understory composition and density.

1990 TREND ASSESSMENT

While this site maintains a moderate density of mountain big sagebrush, data shows a notable decline (21%) in density. The sagebrush population was classified as 59% decadent compared to 42% in 1984. Sagebrush canopy cover averages 22%. The plants are large and healthy, and have a light to moderate hedged growth form. Several herbaceous components have increased, mostly Sandberg bluegrass (80% quadrat frequency) and dyers woad (88% quadrat frequency), which are both increasers. Deer use is light. There is no evidence of recent soil erosion.

TREND ASSESSMENT
soil - stable (3)
browse - slight downward trend, increased decadency and lower densities in sagebrush (2)
herbaceous understory - up but composition is poor, can carry a destructive fire (5)

1996 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in percent bare ground and a decline in litter cover due to the fire. Erosion does not appear to be a problem however. The browse trend is down and nearly absent on the site. A few sagebrush seedlings were found, but they will likely not survive to maturity due to competition with the abundant and weedy herbaceous understory. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses remained similar to 1990 estimates, while frequency of forbs declined. The decline in forb nested frequency comes primarily from a significant decline in the frequency of dyers woad (235 to 122).

TREND ASSESSMENT
soil - down slightly (2)
browse - down, eliminated by fire (1)
herbaceous understory - stable but poor composition which is dominated by annual grasses and weedy forbs (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 13

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron spicatum	3	4	4	1	3	1	.15
G	Aristida purpurea	7	3	6	2	1	2	.41
G	Bromus brizaeformis (a)	-	-	97	-	-	49	.57
G	Bromus tectorum (a)	-	-	253	-	-	87	10.29
G	Festuca myuros (a)	-	-	19	-	-	10	.85
G	Poa bulbosa	-	-	3	-	-	1	.03
G	Poa secunda	$_{a}$20	$_{b}$225	$_{b}$218	12	80	78	11.27
G	Sporobolus cryptandrus	-	3	-	-	1	-	-
Total for Annual Grasses		0	0	369	0	0	146	11.71
Total for Perennial Grasses		30	235	231	15	85	82	11.86
Total for Grasses		30	235	600	15	85	228	23.57
F	Achillea millefolium	10	15	7	4	5	3	.21
F	Agoseris glauca	$_{a}$1	$_{b}$16	$_{ab}$7	1	9	4	.04
F	Alyssum alyssoides (a)	-	-	70	-	-	30	.40
F	Ambrosia artemisifolia	$_{b}$50	$_{b}$20	$_{a}$4	19	9	2	.03
F	Artemisia ludoviciana	1	4	3	1	1	1	.38
F	Astragalus spp.	-	5	-	-	3	-	-
F	Astragalus utahensis	-	-	3	-	-	2	.01
F	Calochortus nuttallii	$_{a}$-	$_{b}$31	$_{a}$1	-	12	1	.00
F	Collomia linearis (a)	-	-	2	-	-	2	.03
F	Collinsia parviflora (a)	-	-	4	-	-	2	.06
F	Crepis acuminata	$_{a}$-	$_{b}$18	$_{b}$29	-	9	14	.44
F	Epilobium brachycarpum (a)	-	-	8	-	-	5	.03
F	Euphorbia spp.	-	-	1	-	-	1	.00
F	Galium aparine (a)	-	-	5	-	-	2	.03
F	Hackelia patens	-	-	-	-	-	-	.03
F	Helianthus annuus (a)	-	$_{a}$1	$_{b}$11	-	1	6	.63
F	Heterotheca villosa	1	1	1	1	1	1	.21
F	Holosteum umbellatum (a)	-	-	35	-	-	18	.19
F	Isatis tinctoria	$_{a}$153	$_{b}$235	$_{a}$122	74	88	50	5.34
F	Lactuca serriola	$_{b}$44	$_{a}$4	$_{a}$10	18	2	6	.37
F	Lithospermum ruderale	2	3	3	2	1	1	.33
F	Lupinus argenteus	1	-	-	1	-	-	-
F	Lygodesmia grandiflora	1	2	4	1	1	2	.33

Type	Species	Nested Frequency '84	Nested Frequency '90	Nested Frequency '96	Quadrat Frequency '84	Quadrat Frequency '90	Quadrat Frequency '96	Average Cover % '96
F	Machaeranthera canescens	$_{a}$-	$_{b}$15	$_{b}$18	-	5	8	.89
F	Microsteris gracilis (a)	5	-	6	4	-	3	.09
F	Oenothera pallida	6	-	7	2	-	3	.21
F	Phacelia spp.	3	-	6	1	-	4	.09
F	Phlox longifolia	$_{a}$8	$_{a}$14	$_{b}$29	3	5	12	.33
F	Plantago patagonica (a)	-	-	20	-	-	9	.04
F	Polygonum douglasii (a)	-	-	49	-	-	25	.40
F	Tragopogon dubius	$_{b}$146	$_{ab}$122	$_{a}$85	65	49	41	1.55
F	Verbascum thapsus	$_{a}$-	$_{a}$-	$_{b}$51	-	-	19	1.81
Total for Annual Forbs		5	1	210	4	1	102	1.93
Total for Perennial Forbs		427	505	391	193	200	175	12.64
Total for Forbs		432	506	601	197	201	277	14.58

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 13

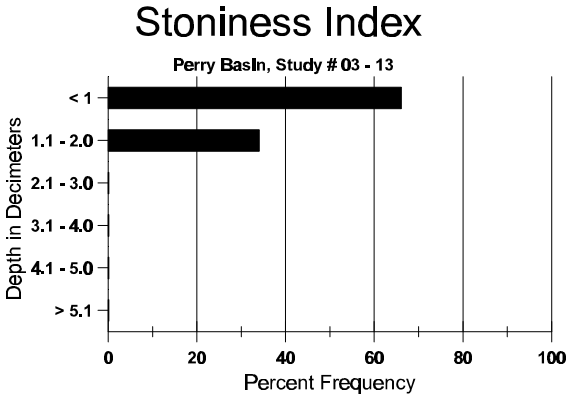
Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	0	.02
B	Chrysothamnus nauseosus consimilis	1	.38
B	Chrysothamnus viscidiflorus viscidiflorus	2	-
Total for Browse		3	0.40

BASIC COVER --
Herd unit 03 , Study no: 13

Cover Type	Nested Frequency '96	Average Cover % '84	'90	'96
Vegetation	335	1.00	15.75	38.44
Rock	66	.25	0	.90
Pavement	375	26.00	25.25	45.22
Litter	173	72.00	55.75	2.09
Cryptogams	6	.50	0	.01
Bare Ground	181	.25	3.25	8.69

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 13, Perry Basin

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
22.0	69.0 (18.1)	6.3	66.2	17.4	16.4	2.6	20.7	256.0	.4



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 13

Type	Quadrat Frequency '96
Rabbit	2

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 13

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
Y	84	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	90	2	-	-	1	-	-	-	-	-	3	-	-	-	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	5	7	10	-	-	-	-	-	-	20	-	1	1	1466	33	31	22
	90	13	1	-	-	-	-	-	-	-	14	-	-	-	933	30	29	14
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	6	16	-	-	-	-	-	-	15	-	4	3	1466			22
	90	18	6	-	-	-	-	-	-	-	18	-	1	5	1600			24
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	900			45

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	25%	50%	17%	-21%
'90	17%	00%	15%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	3465	Dec:	42%
	'90	2733		59%
	'96	0		0%

Chrysothamnus nauseosus consimilis																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	35	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	14	24	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'84	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	40			-

Gutierrezia sarothrae																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	466	10	11	7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'84	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)			
'84	0	Dec:	0%
'90	799		42%
'96	0		0%

*****Suspended*****

Trend Study 3-14-96

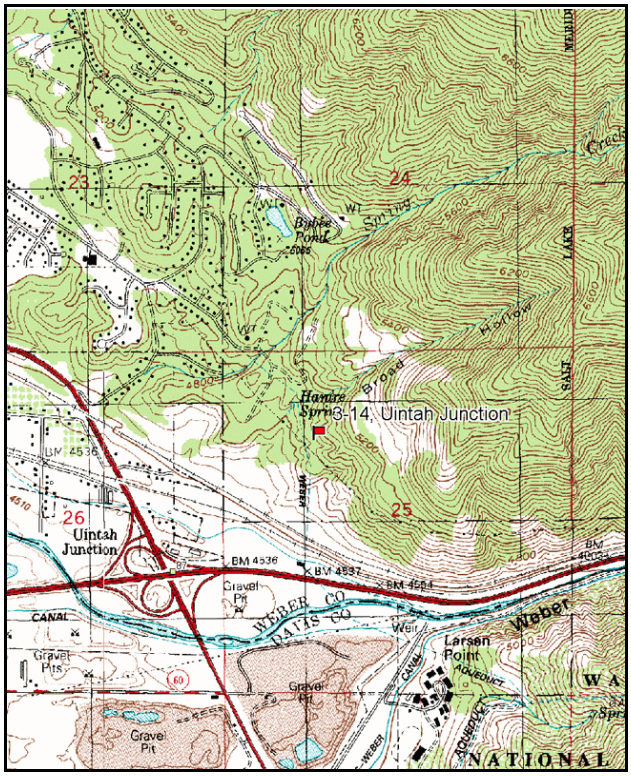
Study site name: Uintah Junction . Vegetation type: Mixed Oak-Sage .

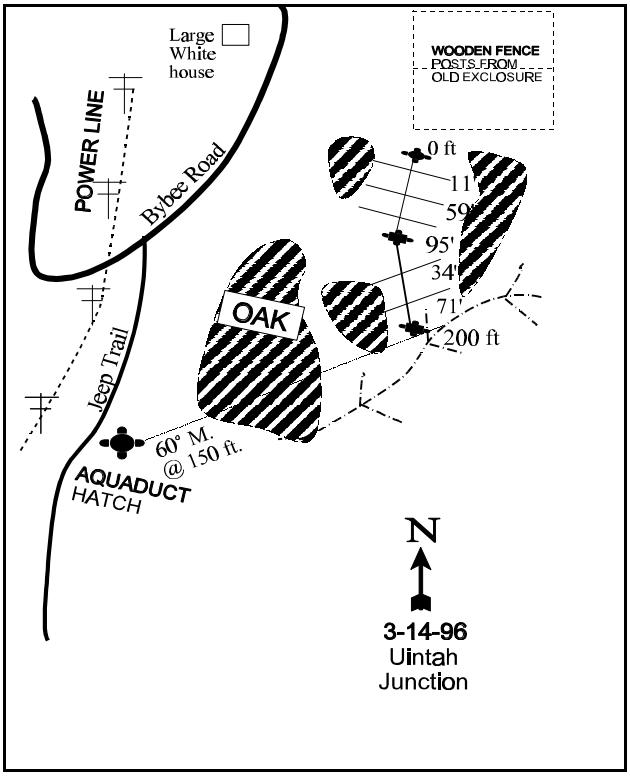
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11, 59, & 95ft), line 2 (34 & 71ft).

LOCATION DESCRIPTION

Beginning at the point above Uintah Junction where the railroad crosses U-89 (two tracks 300 yards apart), travel northwest on U-89 for approximately 100 yards then turn right on Combe Road. Proceed northeast on Combe Road for 0.5 miles to Woodland Drive. Turn right, go 100 yards up Woodland Drive and turn right on Bybee Road. Proceed on Bybee for approximately 1 mile, past new (1990) homes and building lots to where the new road passes under a powerline. At the mouth of the small draw to the east, there is a concrete aqueduct hatch. The beginning of the baseline is on the skyline to the northeast, 250 feet bearing 24 degrees from the concrete hatch. The 0-foot baseline stake is marked by a browse tag.





Map Name: Ogden

Diagrammatic Sketch

Township 5N , Range 1W , Section 25

UTM 4554810 N 424010 E

DISCUSSION

Trend Study No. 3-14

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This is a poor site as it lies in close proximity to homes and is dominated by Gambel oak brush. Very little sagebrush remains on the site. Deer pellets were found only on game trails transecting the slope. This site was evaluated by the Assistant Project Leader's and suspended due to very little wildlife use and lack of key browse. Text and data tables are included from the 1996 report.

The Uintah Junction study is located on the foothills of the Wasatch Face just north of the mouth of Weber Canyon. The site initially sampled critical and very limited winter range on the front. These low elevation slopes (4,880 feet at the study site) were used heavily by deer in the early 1980's. The steep west facing slopes are covered by a mixture of Gambel oak and sagebrush. The transect is on private land. Land to the north is managed as a protected watershed by the Forest Service and part of the section is owned by the DWR. Development is progressing on the more suitable sites, but as this area is so steep and on an aqueduct, it will probably not be converted to a subdivision. Houses occur 300 yards from the site, and off road vehicle use is a possible threat to soil stability.

The soil is a moderately deep, well-drained clay loam with a neutral soil reaction (7.2 pH). Limestone rock that occurs on the surface is covered by litter. Phosphorus and potassium could both be a limiting factor with only 4.1 and 20.7 ppm where values of 10 and 70 ppm respectively, have been shown to limit plant growth and/or development. Soil temperature is very high (80° F at 16") due to the aspect and slope. The potential for severe erosion is high unless a more permanent cover is maintained. Currently erosion is not severe, although some soil movement is inevitable and evidenced by pedestaling and terracing of plants.

A moderately dense stand of Gambel oak provides 93% of the browse cover and most of the forage production on the site. The oak numbered 9,733 stems per acre in 1984, with 36% classified as young and biotic potential (proportion of seedlings) was 12%. The available twigs had been moderately browsed. Since then, the population has become increasingly mature. Currently ('96), mature plants account for 79% of the population. Decadent plants are few and young oak are common. Utilization is mostly light.

Basin big sagebrush currently comprises only 7% of the browse cover, with 880 plants/acre estimated in 1996. The population has become more mature (68% currently) with few young and no seedlings encountered during any year sampled. Use is mostly light, yet vigor is poor on 20% of the population. Broom snakeweed has declined from 1,533 plants/acre in 1985 to only 380 by 1996.

Grasses provide some erosion control and forage. The most abundant perennial species include bulbous bluegrass and bluebunch wheatgrass. They grow best in the interspaces and appear to be suppressed by shade from the dense oak clones. Annual grasses, consisting of cheatgrass and Japanese brome, are abundant and account for 43% of the grass cover. A variety of forbs are represented and many are valuable for forage and/or watershed protection. Common perennial forbs would include bastard toadflax, yellow sweet clover and yellow salsify.

1985 APPARENT TREND ASSESSMENT

An increasing density of Gambel oak will further exclude grasses and sagebrush and could cause a downward vegetative trend. Currently, the area provides a variety of browse and herbaceous forage, but a dense stand of oak would be much like the rest of the front, which would encourage the deer to go even lower to find browse. The soil is stable at low levels of erosion, unless it is disturbed by off road vehicular activity.

1990 TREND ASSESSMENT

The density of sagebrush on this mixed oak/sage range has declined slightly. There is a higher percentage of decadent plants in the light to moderately hedged population. Although the Gambel oak provides competition to the sagebrush, the biggest threat to this winter range is the continued housing and road development just below the site. The oak has been moderately hedged by deer and its vigor has been impacted by insects and drought. Grasses, mainly bluebunch wheatgrass and bulbous bluegrass, are vigorous and abundant. Bluebunch wheatgrass is stable, but there was a loss in the density of bulbous bluegrass which can be useful in early spring. There is evidence of slight erosion and pedestaling, but overall the vegetative and litter cover is adequate to prevent serious erosion.

TREND ASSESSMENT
soil - stable (3)
browse - downward, 50% of the sagebrush was lost (1)
herbaceous understory - slightly downward (2)

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground from 14% to 2%. Some soil movement is inevitable but erosion is not currently a problem. Trend for sagebrush is stable. The sagebrush density is similar to 1990 estimates. Percent decadence declined from 45% to 13%, but vigor is poor on 20% of the shrubs. Utilization is mostly light. Trend for Gambel oak appears stable with similar densities in 1985 and 1990. Trend for the herbaceous understory is stable with similar sum of nested frequency values for perennial grasses and forbs. Nested frequency of bluebunch wheatgrass increased while frequency of bulbous bluegrass declined significantly.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 14

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
G	Agropyron intermedium	$_{b}$13	$_{a}$-	$_{ab}$11	5	-	4	.93
G	Agropyron spicatum	115	111	125	44	43	47	5.51
G	Aristida purpurea	-	-	1	-	-	1	.03
G	Bromus japonicus (a)	-	-	79	-	-	28	1.13
G	Bromus spp.	3	-	-	1	-	-	-
G	Bromus tectorum (a)	-	-	204	-	-	60	8.21
G	Poa bulbosa	$_{c}$298	$_{b}$226	$_{a}$131	83	79	41	5.52
G	Poa pratensis	$_{ab}$5	$_{b}$13	$_{a}$-	2	5	-	-
G	Poa secunda	$_{a}$3	$_{b}$17	$_{ab}$7	1	7	2	.06
G	Sporobolus cryptandrus	1	4	2	1	1	1	.00
Total for Annual Grasses		0	0	283	0	0	88	9.35
Total for Perennial Grasses		438	371	277	137	135	96	12.07
Total for Grasses		438	371	560	137	135	184	21.42
F	Agoseris glauca	1	-	4	1	-	1	.00
F	Allium spp.	-	3	-	-	1	-	-
F	Ambrosia psilostachya	$_{b}$11	$_{a}$-	$_{a}$-	5	-	-	-
F	Arenaria spp.	$_{b}$14	$_{a}$-	$_{a}$-	7	-	-	-
F	Artemisia ludoviciana	30	11	15	11	4	6	.28
F	Astragalus convallarius	3	5	15	3	2	6	.37
F	Aster spp.	3	-	-	1	-	-	-
F	Calochortus nuttallii	3	-	2	1	-	1	.03
F	Cirsium vulgare	2	-	-	1	-	-	-
F	Comandra pallida	$_{b}$69	$_{a}$18	$_{ab}$40	26	9	16	1.54
F	Crepis acuminata	$_{b}$15	$_{c}$17	$_{a}$-	6	9	-	-
F	Cryptantha spp.	-	3	-	-	1	-	-
F	Erodium cicutarium (a)	3	-	2	1	-	1	.00
F	Hackelia patens	-	-	-	-	-	-	.00
F	Hedysarum boreale	$_{b}$25	$_{ab}$10	$_{a}$3	12	6	2	.18
F	Helianthus spp.	2	-	-	1	-	-	-
F	Lactuca serriola	-	-	13	-	-	5	.02
F	Lithospermum ruderale	-	2	-	-	1	-	-
F	Lomatium spp.	-	8	-	-	3	-	-
F	Lygodesmia grandiflora	$_{c}$40	$_{a}$-	$_{b}$13	16	-	6	.17
F	Melilotus officinalis	$_{a}$-	$_{a}$-	$_{b}$92	-	-	39	7.34

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
F	Medicago sativa	6	1	1	3	1	1	.03
F	Oenothera caespitosa	2	-	-	1	-	-	-
F	Penstemon spp.	3	-	-	2	-	-	-
F	Phlox longifolia	$_{a}$3	$_{b}$71	$_{a}$26	3	29	11	.10
F	Sphaeralcea coccinea	$_{b}$56	$_{ab}$49	$_{a}$18	21	18	7	.26
F	Tragopogon dubius	$_{b}$89	$_{a}$45	$_{c}$111	41	22	50	1.43
F	Unknown forb-perennial	-	10	2	-	4	2	.06
F	Zigadenus paniculatus	15	3	11	6	2	4	.07
Total for Annual Forbs		3	0	2	1	0	1	0.00
Total for Perennial Forbs		392	256	366	168	112	157	11.92
Total for Forbs		395	256	368	169	112	158	11.93

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 14

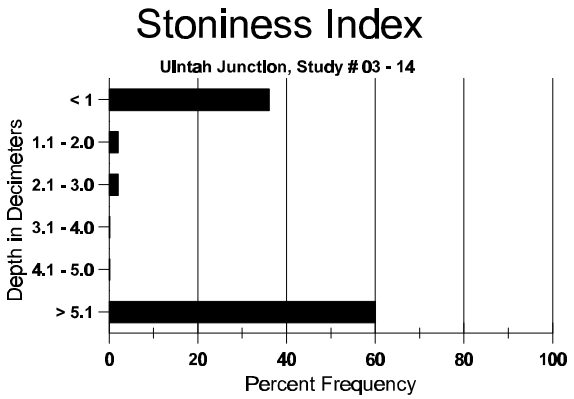
Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata tridentata	28	2.65
B	Gutierrezia sarothrae	12	.08
B	Quercus gambelii	82	34.46
Total for Browse		122	37.19

BASIC COVER --
Herd unit 03 , Study no: 14

Cover Type	Nested Frequency	Average Cover %		
	'96	'85	'90	'96
Vegetation	371	18.00	6.50	63.57
Rock	57	0	.25	3.25
Pavement	14	0	.25	.03
Litter	396	63.25	78.75	72.08
Cryptogams	2	0	.75	.00
Bare Ground	43	18.75	13.50	1.61

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 14, Uintah Junction

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.1	80.3 (15.7)	7.2	42.6	33.1	24.4	1.2	4.1	16.0	.5



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 14

Type	Quadrat Frequency '96
Deer	3

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 14

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata tridentata																		
Y	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	90	-	-	-	2	-	-	-	-	-	2	-	-	-	133			2
	96	2	-	-	6	-	-	-	-	-	4	-	4	-	160			8
M	85	7	4	-	-	-	-	-	-	-	11	-	-	-	733	22	17	11
	90	2	2	-	-	-	-	-	-	-	4	-	-	-	266	22	26	4
	96	24	5	-	1	-	-	-	-	-	26	-	4	-	600	25	33	30
D	85	3	4	-	-	-	-	-	-	-	6	-	1	-	466			7
	90	2	2	-	1	-	-	-	-	-	4	-	-	1	333			5
	96	4	1	-	1	-	-	-	-	-	5	-	1	-	120			6
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	36%	00%	05%	-50%
'90	36%	00%	09%	+17%
'96	14%	00%	20%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	1465	Dec:		32%
'90	732			45%
'96	880			14%

Gutierrezia sarothrae																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	85	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	9	10	15
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	14	13	4
	96	12	-	-	1	-	-	-	-	-	13	-	-	-	260	17	22	13
D	85	2	-	-	-	-	-	-	-	-	1	-	-	1	133			2
	90	7	-	-	-	-	-	-	-	-	1	-	-	6	466			7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	04%	-52%
'90	00%	00%	55%	-48%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	1533	Dec:		9%
'90	732			64%
'96	380			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	2	-	-	-	-	-	3	-	-	5	-	-	-	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400	8	9	6
	90	6	-	-	-	-	-	2	-	-	7	-	1	-	533	6	11	8
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	+46%
'90	00%	00%	08%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	466	Dec:	-
	'90	866		-
	'96	0		-

Quercus gambelii																		
S	85	18	-	-	-	-	-	-	-	-	17	1	-	-	1200			18
	90	6	-	-	-	-	-	-	-	-	5	1	-	-	400			6
	96	53	-	-	-	-	-	-	-	-	53	-	-	-	1060			53
Y	85	51	2	-	-	-	-	-	-	-	53	-	-	-	3533			53
	90	38	21	3	2	-	-	1	-	-	45	14	6	-	4333			65
	96	66	-	-	4	-	-	-	-	-	70	-	-	-	1400			70
M	85	10	74	-	-	-	-	-	-	-	84	-	-	-	5600	32	21	84
	90	14	10	-	6	-	-	-	-	-	9	21	-	-	2000	44	30	30
	96	279	11	-	26	-	-	-	-	-	316	-	-	-	6320	36	35	316
D	85	2	7	-	-	-	-	-	-	-	9	-	-	-	600			9
	90	15	10	1	3	-	-	-	-	-	7	17	5	-	1933			29
	96	8	1	2	2	-	-	-	-	-	11	-	-	2	260			13
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	580			29

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	57%	00%	00%	-15%
'90	33%	03%	09%	- 3%
'96	03%	.50%	.50%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	9733	Dec:	6%
	'90	8266		23%
	'96	7980		3%

*****Suspended*****

Trend Study 3-15-96

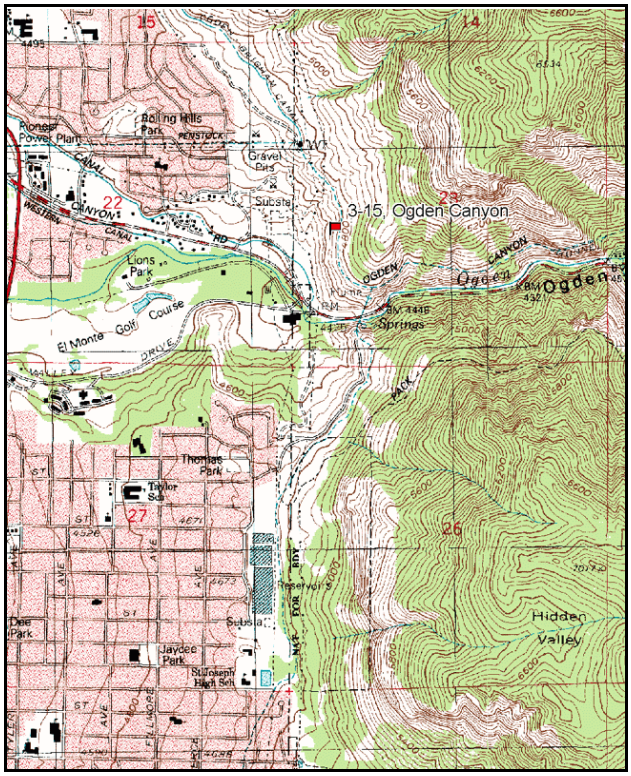
Study site name: Ogden Canyon . Vegetation type: Rubber Rabbitbrush .

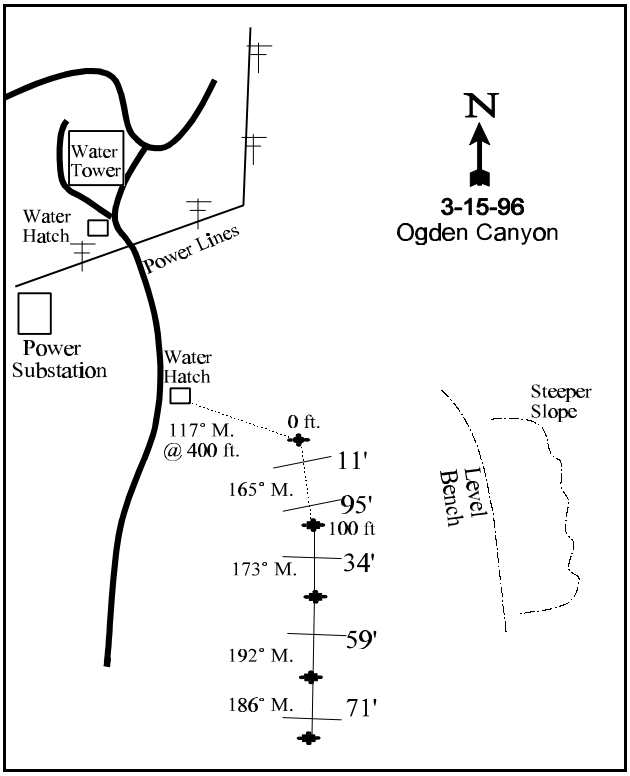
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

The transect is located just north of the mouth of Ogden Canyon. From Ogden, drive east on Canyon Road to 1600 East; north on 1600 East to 1350 South; east on 1350 South to Maxfield Drive (1700 E); north on Maxfield to Hislop Dr. and turn right onto Hislop. You should see a water tower east of you on the hillside. Drive past the water tower, under the power lines and stop where there is one water hatch on the west side of the road and then another one on the east side of the road (with a wood top). From the water hatch, the study begins 400 feet southeast (117 degrees magnetic) on the edge of a small bench. Walk to the top of the slope above the patch of oak. The baseline stake is 5 to 10 yards south along the rim. The baseline runs 165 degrees magnetic.





Map Name: Ogden

Diagrammatic Sketch

Township 6N , Range 1W , Section 23

UTM 4655540 N 422410 E

DISCUSSION

Trend Study No. 3-15

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. This site was evaluated by the Project Leader and suspended due to no sign of wildlife use and the lack of important browse on the site. Text and data tables are included from the 1996 report.

The Ogden Canyon transect, like 3-14, is located in the foothills just above major housing, road and water developments on the Wasatch Front. It is just north of the mouth of Ogden Canyon at an elevation of 4,840 feet. The study samples a rubber rabbitbrush/grass range type situated on a narrow level bench surrounded by steeper oak-covered slopes. It is only representative of this bench which is about 100 feet wide and 500 feet long. The steeper slopes to the north are more open with greater amounts of Wyoming big sagebrush. In the past, the area was used moderately heavy by wintering deer and occasionally elk.

The soil is classified as the Kilburn-Francis association. The soil is moderately deep with an estimated effective rooting depth (see methods) of nearly 13 inches. Texture is a sandy loam with a slightly alkaline soil reaction (7.4 pH). Soil temperature, like the Uintah Junction site, is very high averaging over 81°F at a depth of about 15 inches. However, neither phosphorus or potassium are limiting. There is a fair buildup of litter under the vegetation, which helps prevent erosion. According to the USDA Davis-Weber soil survey (1968), the climax vegetation on this soil type and location is 80% perennial grasses, 10% forbs and 10% shrubs. However, annual grasses and weedy annual and perennial forbs dominate the site.

The principal browse species on the site consist of white rubber rabbitbrush and basin big sagebrush. Rabbitbrush currently numbers 700 plants/acre and accounts for 46% of the browse cover, while basin big sagebrush numbers 620 plants/acre and makes up 18% of the shrub cover. The rabbitbrush plants are large, vigorous and lightly hedged. The population appears stable. Basin big sagebrush increased in density between 1990 and 1996 from 266 plants/acre to 620. Comparing the age structure with the previous readings, it appears that the increase in density is primarily due to the much larger sample size used in 1996 giving a more accurate estimate of shrub densities. Use of the sagebrush was light in the past and is currently ;mostly light.

A few tall Utah serviceberry are found on the site. They have been high-lined to the height that deer can reach and now the shrubs average over 10 feet in height with all new growth unavailable. Some of the nearby oaks are tall and have also have been high-lined. Oak is not abundant on the site yet it dominates surrounding areas. The most numerous browse species is broom snakeweed, a low value invader, but it only contributes to 1% of the browse cover. Large clumps of pricklypear cactus are also present under the rabbitbrush.

The herbaceous understory is abundant. However, composition is poor. The grass component is dominated by cheatgrass which accounts for 54% of the grass cover. The next most abundant grass is bulbous bluegrass which makes up an additional 22% of the grass cover. Another undesirable grass found on the site is red three-awn, a warm season perennial increaser. Preferred perennial grasses that exist on the site, but in lower abundance, include bluebunch wheatgrass, Sandberg bluegrass, and sand dropseed. The bluebunch wheatgrass is large and especially valuable for watershed protection and forage.

Forbs are diverse but not particularly abundant. The most abundant perennial forbs include fleabane, Utah sweetvetch, and hairy goldaster.

1985 APPARENT TREND ASSESSMENT

As with most of the low elevation foothill winter range along the front, the biggest threat is development, roads and ORV use. If left undisturbed, the soil trend should remain stable. However, the vegetative trend appears to be downward. The preferred browse species are heavily hedged and becoming unavailable to deer. Broom snakeweed and other invaders appear to be increasing. Management options are limited due to land ownership and watershed concerns.

1990 TREND ASSESSMENT

The vegetative trend has not been as rapidly downward as thought in 1985. Desirable browse remains limited, but the diversity and frequency are unchanged. There is some reproduction of basin big sagebrush with the plants appearing vigorous. The shrubs are lightly to moderately hedged, except the heavily browsed serviceberry which occur in very low densities. Broom snakeweed declined in density. Prickly-pear cactus remains common. Perennial grasses dominate the understory. There were shifts in forb species composition, most notably with increases in hairy goldaster and Dyers woad, and decreases in other species. There is minimal erosion on the 20% slope of the lake terrace, but the steeper slopes have less vegetation and detectable erosion with a surface covered with rock and pavement.

TREND ASSESSMENT
soil - stable (3)
browse - slight decline (2)
herbaceous understory - slight decline (2), grasses are fairly stable, but the forbs are mostly decreasing with dyers woad increasing greatly

1996 TREND ASSESSMENT

Trend for soil is slightly up. Percent bare ground has declined and is currently at only 1%. Herbaceous vegetation is abundant, well dispersed and limits erosion. Trend for browse appears stable at this time. The density for white rubber rabbitbrush is comparable to 1985 estimates. The sharp decline in 1990 appears questionable due to the general lack of dead rabbitbrush plants (20 plants/acre). There may have been a sampling or identification problem that year. Reproduction of the rabbitbrush is limited but use is light, vigor normal and percent decadence low at 11%. Basin big sagebrush shows an increase in density (up 57%) since 1990. However, this change appears to be the result of the much larger sample used in 1996 giving better population estimates for shrubs. Density of mature plants has remained similar since 1990. Reproduction is adequate yet vigor is poor on 23% of the population. Percent decadence has risen to 19%. The appearance of oak brush in the sample in 1996 is also the result of the larger sample. Overall trend for the browse appears stable. Trend for the herbaceous understory is also stable. Sum of nested frequency for perennial grasses increased sightly, yet the composition appears to be deteriorating further toward annuals and weedy species. The largest increase in sum of nested frequency came from bulbous bluegrass. Sandberg bluegrass and sand dropseed have declined significantly in sum of nested frequency with each reading. Bluebunch wheatgrass has shown an increase in its nested frequency values, but still only contributes to 5% of the grass cover. Sum of nested frequency for perennial forbs has increased, although overall forbs are not abundant as they only contribute to 18% of the herbaceous cover.

TREND ASSESSMENT
soil - up slightly (4)
browse - stable (3)
herbaceous understory - stable, but dominated by cheatgrass and weedy forbs (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
G	Agropyron spicatum	72	59	77	26	28	27	2.87
G	Aristida purpurea	$_{b}$91	$_{a}$55	$_{a}$27	36	26	13	1.17
G	Bromus japonicus (a)	-	-	11	-	-	4	.07
G	Bromus tectorum (a)	-	-	309	-	-	89	17.21
G	Poa bulbosa	$_{a}$34	$_{b}$87	$_{c}$158	14	35	51	6.95
G	Poa secunda	$_{b}$120	$_{a}$50	$_{a}$47	47	25	19	.85
G	Sporobolus cryptandrus	$_{b}$111	$_{ab}$93	$_{a}$60	48	49	29	2.50
Total for Annual Grasses		0	0	320	0	0	93	17.28
Total for Perennial Grasses		428	344	369	171	163	139	14.36
Total for Grasses		428	344	689	171	163	232	31.64
F	Alyssum alyssoides (a)	-	-	15	-	-	8	.06
F	Allium spp.	$_{a}$2	$_{b}$17	$_{a}$-	1	7	-	-
F	Ambrosia psilostachya	$_{b}$36	$_{a}$-	$_{a}$3	16	-	3	.19
F	Artemisia ludoviciana	$_{a}$63	$_{b}$35	$_{b}$21	23	15	9	.41
F	Cynoglossum officinale	$_{a}$-	$_{a}$-	$_{b}$45	-	-	23	.41
F	Erigeron bellidiastrm (a)	-	-	37	-	-	16	1.68
F	Erodium cicutarium (a)	$_{b}$18	$_{a}$-	$_{b}$28	8	-	9	.76
F	Erigeron spp.	$_{b}$37	$_{a}$-	$_{a}$-	18	-	-	-
F	Galium aparine (a)	-	-	2	-	-	1	.00
F	Gayophytum ramosissimum (a)	-	-	9	-	-	4	.02
F	Hackelia patens	-	-	2	-	-	1	.00
F	Hedysarum boreale	25	10	22	14	6	9	1.49
F	Heterotheca villosa	$_{a}$-	$_{c}$20	$_{b}$10	-	9	5	.98
F	Holosteum umbellatum (a)	-	-	9	-	-	4	.02
F	Isatis tinctoria	$_{a}$3	$_{b}$33	$_{b}$30	1	16	15	.55
F	Lactuca serriola	-	1	-	-	1	-	-
F	Machaeranthera canescens	-	-	6	-	-	3	.01
F	Oenothera caespitosa	2	-	-	1	-	-	-
F	Phlox longifolia	-	-	6	-	-	2	.01
F	Polygonum douglasii (a)	-	-	13	-	-	7	.03
F	Tragopogon dubius	$_{b}$11	$_{a}$-	$_{b}$10	5	-	7	.09
F	Unknown forb-perennial	$_{b}$42	$_{a}$-	$_{a}$5	16	-	3	.06

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
Total for Annual Forbs		18	0	113	8	0	49	2.59
Total for Perennial Forbs		221	116	160	95	54	80	4.22
Total for Forbs		239	116	273	103	54	129	6.81

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 15

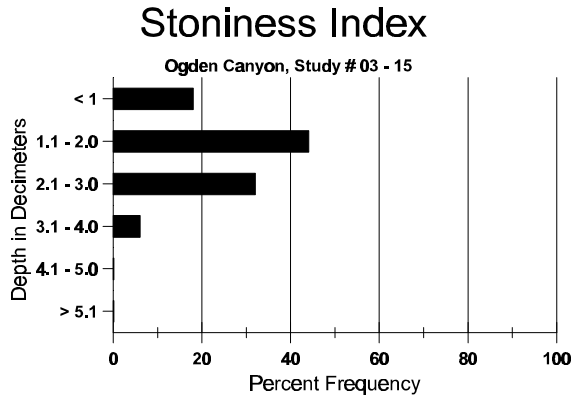
Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier utahensis	1	.63
B	Artemisia tridentata tridentata	24	2.71
B	Celtis reticulata	-	.38
B	Chrysothamnus nauseosus albicaulis	22	6.72
B	Chrysothamnus viscidiflorus viscidiflorus	1	.15
B	Gutierrezia sarothrae	15	.22
B	Opuntia spp.	25	1.66
B	Quercus gambelii	5	2.19
Total for Browse		93	14.68

BASIC COVER --
Herd unit 03 , Study no: 15

Cover Type	Nested Frequency	Average Cover %		
	'96	'85	'90	'96
Vegetation	377	14.25	5.75	53.93
Rock	158	6.00	9.25	9.73
Pavement	132	2.00	14.50	3.67
Litter	383	54.25	66.00	53.44
Cryptogams	25	0	.25	.33
Bare Ground	75	23.50	4.25	.96

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 15, Ogden Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.8	81.2 (14.5)	7.4	73.9	12.1	14.0	1.3	12.7	86.4	.6



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 15

Type	Quadrat Frequency '96
Rabbit	4
Elk	1
Deer	21

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 15

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
M	85	-	-	-	-	-	1	-	-	-	1	-	-	-	66	69	157	1
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66	108	197	1
	96	-	-	-	-	-	-	1	-	-	1	-	-	-	20	128	154	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	100%	00%	+ 0%
'90	00%	100%	00%	-70%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	66	Dec:	-
	'90	66		-
	'96	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata tridentata																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	3	-	-	-	-	-	-	-	3	-	-	-	200	12	14	3
	96	10	3	-	1	-	-	-	-	-	9	-	5	-	280	21	32	14
D	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	3	1	1	-	-	-	-	-	4	-	2	-	120			6
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	+ 0%
'90	75%	00%	00%	+57%
'96	19%	03%	23%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	266	Dec:		25%
'90	266			0%
'96	620			19%

Chrysothamnus nauseosus albicaulis																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666	23	31	10
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	30	41	4
	96	30	-	-	-	-	-	-	-	-	30	-	-	-	600	31	58	30
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80			4
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	-30%
'90	00%	00%	00%	+34%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	666	Dec:		0%
'90	465			29%
'96	700			11%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	38	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	0	Dec:		-
'90	0			-
'96	20			-

Gutierrezia sarothrae																		
S	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	38	-	-	-	-	-	-	-	-	38	-	-	-	760			38
M	85	33	-	-	-	-	-	-	-	-	33	-	-	-	2200	8	6	33
	90	5	-	-	1	-	-	-	-	-	6	-	-	-	400	13	16	6
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500	9	9	25
D	85	7	-	-	-	-	-	-	-	-	4	-	3	-	466			7
	90	2	-	-	-	-	-	-	-	-	1	-	-	1	133			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	06%	-80%
'90	00%	00%	10%	+47%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	3266	Dec:		14%
'90	666			20%
'96	1260			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	85	8	-	-	-	-	-	-	-	-	7	-	-	1	533			8
	90	3	-	-	-	-	-	-	-	-	2	1	-	-	200			3
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	85	7	1	-	-	-	-	-	-	-	7	-	1	-	533	7	7	8
	90	6	-	-	-	-	-	-	-	-	3	1	2	-	400	5	9	6
	96	55	-	-	1	-	-	-	-	-	56	-	-	-	1120	8	18	56
D	85	8	-	-	-	-	-	-	-	-	5	-	1	2	533			8
	90	9	-	-	-	-	-	-	-	-	4	-	-	5	600			9
	96	5	-	-	-	-	-	-	-	-	-	-	-	5	100			5
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	04%	00%	21%	-25%
'90	00%	00%	39%	+ 5%
'96	00%	00%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	1599	Dec:	33%
	'90	1200		50%
	'96	1260		8%

Quercus gambelii																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	24	-	-	-	-	-	-	-	-	24	-	-	-	480	38	44	24

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'90	0		-
	'96	580		-

*****Suspended*****

Trend Study 3-16-96

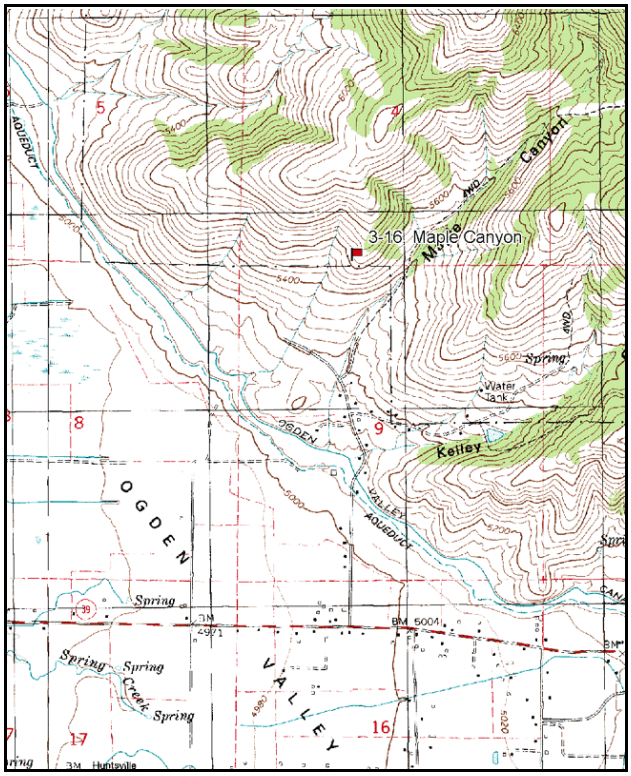
Study site name: Maple Canyon . Vegetation type: Big Sagebrush-Grass .

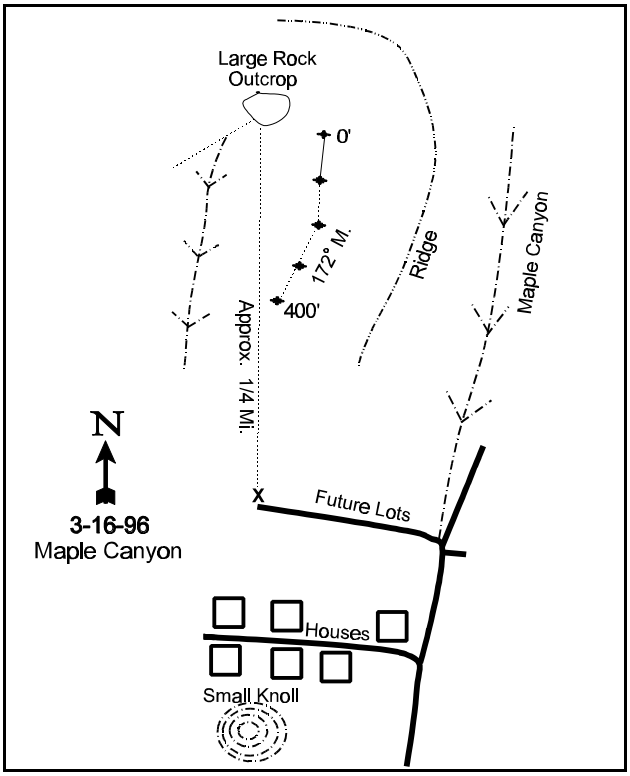
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection where Highway U-39 turns 90 degrees and heads east towards Monte Cristo, continue 1.5 miles to mile marker 21 (9000 East). Turn left and proceed 1.1 miles to the mouth of the bowl-shaped draw adjacent to Maple Canyon. Walk up the draw to a 20 foot wide large flat rock located on the east side of the draw approximately half way to the top. From the rock go 35 feet at 135 degrees magnetic to the starting point of the baseline. The stake has a red browse tag #7033 attached. Stakes are three feet high rebar stakes. Rock outcrop is on the east side of the drainage about 1 ft. from the bottom of the draw. Most of this area is now being developed. In the future, access to the area may be restricted by homes being built.





Map Name: Brown's Hole

Diagrammatic Sketch

Township 6N , Range 2E , Section 4

UTM 4570667 N 438664 E

DISCUSSION

Trend Study No. 3-16

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. Development in the area is restricting access and decreasing the importance of this site as big game winter range. Also, the site burned prior to the 1996 reading and most of the key browse was lost. After consulting with the local biologist this site was not read in 2001. Text and data tables are included from the 1996 report.

The Maple Canyon study is on a privately-owned southwest facing slope within a small draw above Ogden Valley. It has a 40% slope and an elevation of 5,500 feet. The vegetation was originally dominated by mountain big sagebrush and grass. However, due to a fire that occurred sometime after 1990, it is now mostly cheatgrass, annual and perennial weeds. The ridge top has some big tooth maple. Land at the base of the hills is being developed for houses, except development on the site itself is doubtful due to the slope. The pellet group transect in nearby Maple Canyon showed a varying trend, with generally moderate deer use in the past (Jense et al. 1985). Use from grazing cattle also appeared moderate during the 1985 reading. Currently ('96), only a few deer pellet groups were found on the site.

The soil is fairly shallow and extremely rocky with an effective rooting depth (see methods) estimated at just over 10 inches. Rock are common on the surface (31% cover) and throughout the profile. Soil texture is a sandy clay loam with a neutral soil reaction (6.8 pH). A calcium carbonate layer is present at a depth of about 12 inches. Soil temperature is moderately high at 70.4°F at a depth of 10 inches. There are currently no erosion problems due to abundant protective ground cover.

The dominant species on this site used to be mountain big sagebrush and antelope bitterbrush. The sagebrush plants were vigorous and lightly browsed. Thirty-two percent of the population were seedling and young plants in 1985, but the majority were mature plants under two feet tall. The most preferred browse plant was bitterbrush. Most bitterbrush were heavily hedged with little reproduction noted. Many plants were decadent because of past heavy use (67%) during the early 1980's. A fire burned through the area some time after the 1990 reading. Only a few maple, chokecherry and Wood's rose remain. These species occur in very small numbers. Some seedling, young and one mature sagebrush were found on the site. The nearest existing mature sagebrush stand is about 300 feet down slope.

Escape and thermal cover are nonexistent on the study site, but the rather dense stand of bigtooth maple (*Acer grandidentatum*) over the ridge can provide good cover during the warm season. The available parts of these large trees have been heavily utilized in the past. Point-center quarter data from 1996 estimate 8 trees/acre with an average diameter of 4.2 inches.

The herbaceous understory was previously dominated by perennial forbs. Large arrowleaf balsamroot and Louisiana sagebrush plants were abundant. After the fire, the site is now dominated by annuals and weeds, with perennial grasses being nearly absent. Cheatgrass and Japanese brome account for 98% of the grass cover, while weedy forbs, whitetop, mustard, dyers woad and flannel mullein, make up almost 40% of the forb cover. Some of the more desirable forbs found in 1985 and 1990 still occur but with reduced frequency.

1985 APPARENT TREND ASSESSMENT

The soil trend appears stable because of good litter and vegetative cover. The lack of reproduction and heavy hedging on the bitterbrush could be a downward trend indicator. However, the sagebrush along with the various forbs will continue to provide adequate forage. Cattle may be responsible for the damage to the bitterbrush. They should be removed from the area when they start feeding heavily on it.

1990 TREND ASSESSMENT

There is good vigor and reproduction of big sagebrush on this privately owned winter range. Sagebrush density slightly increased. Sagebrush receives continued moderate use. The bitterbrush is heavily hedged. These large plants appear increasingly decadent with no signs of reproduction at this time. Grasses are still limited, but several species of valuable forbs remain common. Dyers woad has invaded the area. Rocks comprise 25% of the ground surface, yet vegetative and litter cover is generally adequate to hold the soil.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly downward (2)

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 12% to 3%. Although litter cover has declined, protective ground cover remains adequate to prevent erosion. Unfortunately, most of the herbaceous ground cover comes from annual grasses which provided abundant fine fuels for another destructive fire. The browse trend is down and the preferred browse, mountain big sagebrush, has been nearly eliminated from the immediate site. Currently, only small numbers of Wood's rose, maple, and chokecherry remain on the site. Some seedling and young sagebrush were inventoried, but it remains a question if these small plants can effectively compete with the overly abundant herbaceous understory, dominated by annuals and weeds. Trend for the herbaceous understory is also down. Sum of nested frequency for perennial grasses has declined and the remaining species produce less than 1% cover. Sum of nested frequency for perennial forbs has increased primarily due to a very large increase in the sum of nested frequency for prickly lettuce and hoary aster. The previously dominant perennial forbs, Louisiana sagebrush and arrowleaf balsamroot, are still abundant yet with significantly reduced frequency values. Sites like this one and the site at Perry Basin should have been rehabilitated immediately after burning to help avoid the invasion of cheatgrass, noxious weeds and weedy forbs.

TREND ASSESSMENT
soil - up (5)
browse - down and nearly eliminated by fire (1)
herbaceous understory - down and dominated by annual grasses and weedy forbs (1)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 16

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
G	Agropyron smithii	2	-	-	1	-	-	-
G	Agropyron spicatum	$_{ab}$23	$_{b}$33	$_{a}$16	10	15	8	.29
G	Bromus japonicus (a)	-	-	287	-	-	92	6.04
G	Bromus tectorum (a)	-	-	352	-	-	99	20.11
G	Poa bulbosa	-	-	2	-	-	1	.00
G	Poa fendleriana	$_{c}$84	$_{b}$62	$_{a}$1	33	27	1	.00
G	Poa secunda	-	-	10	-	-	3	.30
Total for Annual Grasses		0	0	639	0	0	191	26.15
Total for Perennial Grasses		109	95	29	44	42	13	0.60
Total for Grasses		109	95	668	44	42	204	26.76
F	Achillea millefolium	5	5	3	3	3	3	.04
F	Agoseris glauca	-	8	-	-	4	-	-
F	Allium spp.	$_{b}$15	$_{a}$-	$_{ab}$6	8	-	4	.02
F	Ambrosia psilostachya	-	-	7	-	-	3	.45
F	Artemisia ludoviciana	$_{b}$89	$_{ab}$66	$_{a}$47	32	26	21	2.04
F	Astragalus beckwithii	-	-	2	-	-	1	.00
F	Balsamorhiza sagittata	$_{b}$84	$_{b}$70	$_{a}$28	36	32	13	7.83
F	Cardaria draba	$_{a}$-	$_{a}$-	$_{b}$54	-	-	20	3.86
F	Calochortus nuttallii	-	-	6	-	-	2	.01
F	Cirsium spp.	-	3	-	-	1	-	-
F	Collomia linearis (a)	-	-	35	-	-	17	.11
F	Collinsia parviflora (a)	-	-	10	-	-	4	.02
F	Crepis acuminata	-	-	2	-	-	1	.15
F	Cryptantha spp.	$_{a}$-	$_{a}$-	$_{b}$79	-	-	32	.26
F	Descurainia pinnata (a)	-	-	100	-	-	38	1.33
F	Draba spp. (a)	-	-	77	-	-	27	.31
F	Erodium cicutarium (a)	-	-	40	-	-	17	.38
F	Erigeron strigosis	-	-	-	-	-	-	.04
F	Galium aparine (a)	-	-	2	-	-	1	.00
F	Gayophytum ramosissimum (a)	-	-	6	-	-	2	.01
F	Holosteum umbellatum (a)	-	-	73	-	-	27	.26
F	Isatis tinctoria	$_{a}$-	$_{b}$11	$_{b}$17	-	6	8	1.31
F	Lactuca serriola	$_{a}$-	$_{a}$2	$_{b}$176	-	1	68	1.59
F	Lepidium spp. (a)	-	-	7	-	-	3	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'85	'90	'96	'85	'90	'96	'96
F	Lithospermum spp.	-	-	4	-	-	1	.03
F	Lupinus argenteus	6	1	3	2	1	1	.15
F	Machaeranthera spp	-	-	105	-	-	45	.96
F	Microsteris gracilis (a)	-	-	3	-	-	1	.00
F	Phlox longifolia	$_{b}$14	$_{a}$3	$_{ab}$7	6	1	3	.04
F	Polygonum douglasii (a)	-	-	4	-	-	1	.00
F	Rumex spp.	3	-	-	1	-	-	-
F	Sisymbrium altissimum (a)	$_{b}$44	$_{a}$2	$_{c}$72	17	2	32	.60
F	Stanleya viridiflora	4	3	-	2	1	-	-
F	Tragopogon dubius	$_{a}$11	$_{b}$27	$_{a}$9	4	16	3	.02
F	Unknown forb-perennial	$_{b}$17	$_{a}$3	$_{a}$-	6	1	-	-
F	Verbascum thapsus	-	-	7	-	-	3	1.18
F	Vicia americana	$_{a}$-	$_{a}$-	$_{b}$13	-	-	6	.13
Total for Annual Forbs		44	2	429	17	2	170	3.05
Total for Perennial Forbs		248	202	575	100	93	238	20.14
Total for Forbs		292	204	1004	117	95	408	23.20

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 16

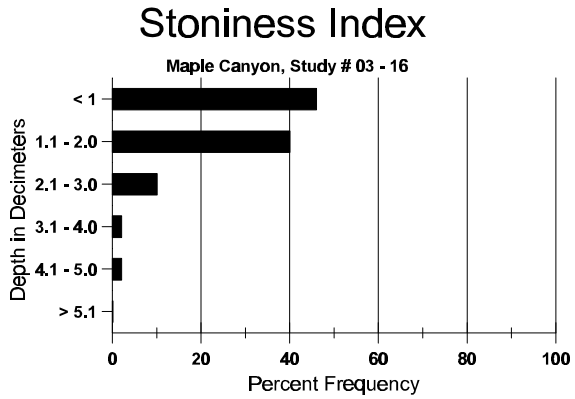
Type	Species	Strip Frequency	Average Cover %
		'96	'96
B	Acer grandidentatum	1	.38
B	Artemisia tridentata vaseyana	9	.09
B	Gutierrezia sarothrae	1	-
B	Prunus virginiana	3	.93
B	Purshia tridentata	0	-
B	Rosa woodsii	1	.15
Total for Browse		15	1.55

BASIC COVER --
Herd unit 03 , Study no: 16

Cover Type	Nested Frequency '96	Average Cover % '85	'90	'96
Vegetation	380	6.50	6.25	50.18
Rock	321	20.75	23.75	30.76
Pavement	115	1.00	1.00	.65
Litter	384	54.25	57.00	42.73
Cryptogams	3	.50	0	.03
Bare Ground	145	17.00	12.00	2.88

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 16, Maple Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.1	70.4 (10.2)	6.8	52.6	23.4	24.0	2.9	27.6	272.0	.4



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 16

Type	Quadrat Frequency '96
Deer	6

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 16

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Acer grandidentatum																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'85	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'85	0	Dec:		-
'90	0			-
'96	20			-

Artemisia tridentata vaseyana																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
Y	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666			10
	90	4	3	-	-	-	-	-	-	-	7	-	-	-	466			7
	96	9	-	-	2	-	-	-	-	-	11	-	-	-	220			11
M	85	18	3	-	-	-	-	-	-	-	21	-	-	-	1400	19	19	21
	90	-	24	-	-	-	-	-	-	-	24	-	-	-	1600	22	26	24
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
D	85	2	1	-	-	-	-	-	-	-	1	2	-	-	200			3
	90	1	6	-	-	-	-	-	-	-	6	-	1	-	466			7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	540			27

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	12%	00%	00%	+11%
'90	87%	00%	03%	-91%
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'85	2266	Dec:	9%
'90	2532		18%
'96	240		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9	16	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'85	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'85	0	Dec:	-
'90	0		-
'96	20		-

Prunus virginiana																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360			18
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'85	00%	00%	00%
'90	00%	00%	00%
'96	25%	00%	25%

%Change

Total Plants/Acre (excluding Dead & Seedlings)			
'85	0	Dec:	0%
'90	0		0%
'96	80		25%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
M	85	-	2	2	-	-	-	-	-	-	4	-	-	-	266	28	48	4
	90	-	1	1	-	-	-	-	-	-	2	-	-	-	133	35	46	2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	85	-	-	2	-	-	-	-	-	-	1	-	1	-	133			2
	90	-	1	3	-	-	-	-	-	-	4	-	-	-	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	33%	67%	17%	+ 0%
'90	33%	67%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	399	Dec:	33%
	'90	399		67%
	'96	0		0%

Rosa woodsii																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	21	47	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'90	0		-
	'96	20		-

Trend Study 3-17-01

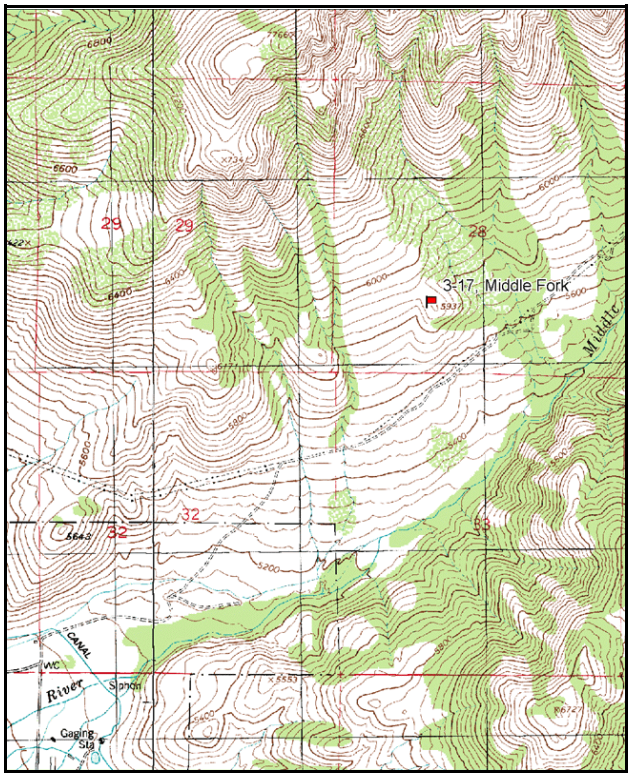
Study site name: Middle Fork . Vegetation type: Low Sagebrush .

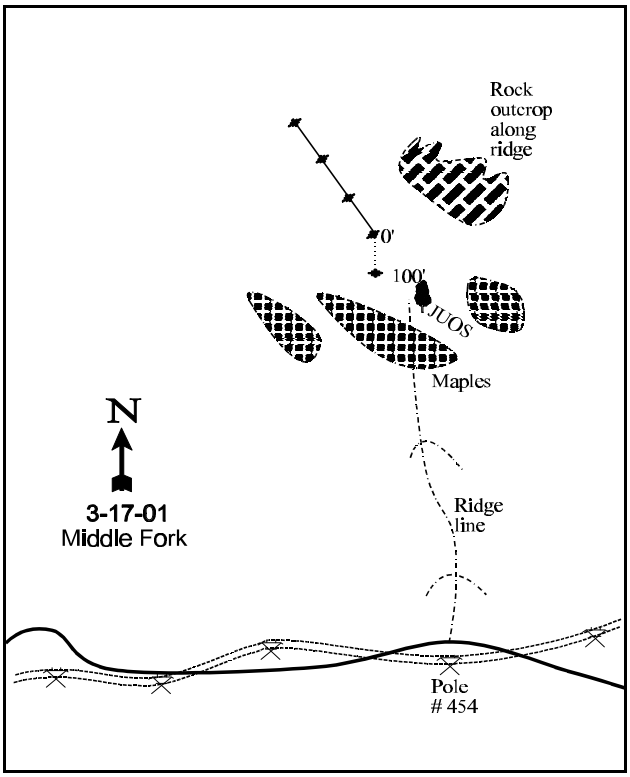
Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft). Rebar: belt 3 on 1 ft.

LOCATION DESCRIPTION

From 5500 East and 2200 North in Eden, proceed 0.4 miles to a bend. Continue east, 1.9 miles further, to where the main road bends to the southeast. Continue straight for 1.9 miles to the state land (middle fork wildlife management area). From the sign, drive 0.1 miles to a three way intersection. Stay left and go through the gate. Continue east 0.05 miles to a fork. Stay left. From the fork continue 0.05 miles to a creek. Cross the creek and continue down a ripped rough road which is now a horse trail for 0.8 miles, going under power lines, to pole #454. Park here and walk up the ridge line beyond the maples to a lone juniper. The 100-foot stake of the frequency baseline is 30 paces away at a bearing of 337 degrees magnetic.





Map Name: Brown's Hole

Diagrammatic Sketch

Township 7N , Range 2E , Section 28

UTM 4573300 N 438694 E

DISCUSSION

Trend Study No. 3-17

The Middle Fork study samples a low sagebrush/grass community overlooking the Middle Fork of the Ogden River. The study lies on a rocky, 20% slope with a southwest aspect. Elevation of the study site is 5,900 feet. The site lies within the Middle Fork Wildlife Management Area owned by the DWR. Although it was heavily grazed to some extent in the past, there are no recent signs of livestock use. In 1996, quadrat frequency of elk pellet groups was moderate with that of deer being light. Quadrat frequency of both elk and deer pellets declined in 2001. Pellet group transect data taken in 2001 estimated 7 elk days use/acre (18 edu/ha) and 15 deer days use/acre (36 ddu/ha). Moose and grouse pellets were also identified on the site in 2001.

The soil is shallow and very rocky with large rocks and rock outcrops abundant on the surface. Soil texture is a clay loam, with a slightly acidic soil reaction (pH of 6.4). Estimated effective rooting depth (see methods) is shallow at less than 9 inches. Due to the rocky nature of the site, average soil temperature was high at 76°F as the soil could only be probed to about 9 inches in depth. An erosion condition class conducted in 2001 determined soils to be stable with minimal erosion.

The most abundant browse is low sagebrush (*Artemisia arbuscula*) which accounted for about 80% of the shrub cover in 1996 and 2001. Mature plants average about one foot in height and show mostly light with some moderate utilization. In 1996 and 2001, recruitment from young plants was high, averaging 20%. Average leader growth is just over 1 inch in 2001.

Other more valuable species in terms of preference are mountain big sagebrush, antelope bitterbrush and serviceberry. However, these species are found in small numbers and are not abundant enough to be considered key species. High competition from a dense weedy understory makes reproduction of these species very difficult, especially with the current drought. They have been moderately to heavily hedged in the past, yet current use is light to moderate. A spreading, but still open stand of bigtooth maple provides fair resting cover, but thermal cover would be limited on the site in winter.

Grasses are moderately abundant and diverse. The most common species is bulbous bluegrass, providing 50% of the grass cover in 1996, increasing to 58% in 2001. Bulbous bluegrass significantly increased in nested frequency and doubled in cover in 2001. Bluebunch wheatgrass also increased in nested frequency and cover in 2001. Cheatgrass and Japanese brome are found on the site and produced 15% of the grass cover in 1996. However, due to drought for the past 2 years these species decreased significantly in nested frequency in 2001. Other somewhat common perennial grasses include Sandberg bluegrass and subalpine needlegrass. Forbs are also fairly abundant and diverse. Yet, the composition is poor with pacific aster, western yarrow, yellow salsify, and mulesears wyethia providing the majority of the forb cover.

1985 APPARENT TREND ASSESSMENT

Overall range trend appears stable. There is a variety of browse and herbaceous forage available. The lack of reproduction of the sagebrush and bitterbrush is the one troubling factor.

1990 TREND ASSESSMENT

Sagebrush canopy cover on this study, comprised of low sagebrush and a smaller amount of mountain big sagebrush, averages almost 15%. The low sagebrush population is relatively stable in terms of numbers, but the percentage of decadent plants has increased to 53%. This could be explained by the very high densities in conjunction with the extended drought. Some areas have an abundance of seedlings. No young mountain big

sagebrush could be identified, as the population also shows an increase in the percentage of decadent shrubs. The sagebrush display average vigor and generally moderate hedging. Bitterbrush is uncommon, but several young plants were encountered. The oaks on top of the hill are kept short by heavy use. Grasses are dense, including several species of annual bromes. Sixteen species of perennial forbs were encountered. There is no sign of soil erosion.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous - stable, but poor composition (3)

1996 TREND ASSESSMENT

Trend for soil is up with a decline in percent bare ground from 6% to <1%. Vegetation and litter cover are abundant, well dispersed, and adequately protect the soil from erosion. Trend for low sagebrush is up slightly. However, density has declined slightly along with percent decadence which has also declined from 53% to 11%. Recruitment is currently excellent with a biotic potential (proportion of seedlings) of 19%, and 21% of the population consists of young plants. Utilization is light to moderate. The more preferred mountain big sagebrush and antelope bitterbrush occur in very small numbers. Some of the change in density in these species is the result of the much larger, more representative sample used in 1996. The lack of dead plants for bitterbrush suggest that the previous samples overestimated its density. This also appears to be the case for mountain big sagebrush which declined by over 200 plants/acre, but only 40 dead plants/acre were estimated. Both of these species seem to be just hanging on at this site and without better reproduction in the future may further decline in their respective densities. The herbaceous understory is abundant but composition is very poor. Sum of nested frequency for perennial grasses has remained similar to 1990, yet the preferred bluebunch wheatgrass has declined significantly in sum of nested frequency. Sandberg bluegrass has also declined significantly in nested frequency, while bulbous bluegrass has increased dramatically from a quadrat frequency of only 14% in 1990 to 81% in 1996. Cheatgrass and Japanese brome are also common. Sum of nested frequency for perennial forbs has increased since 1990. However, most of the increase comes from a significant 15-fold increase in sum of nested frequency for yellow salsify (11 to 169). Currently, western yarrow, pacific aster, yellow salsify and mulesears wyethia provide 72% of the forb cover. Trend for the herbaceous understory is considered slightly down do to the undesirable compositional changes.

TREND ASSESSMENT
soil - up (5)
browse - up slightly for low sagebrush (4)
herbaceous - down slightly with a poor composition of annuals and weeds (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Soils are stable with minimal erosion due to abundant protective cover from vegetation and litter. Trend for browse is stable. The most abundant species, low sagebrush, has a high but stable proportion of young plants in the population. Percent decadency remains stable, vigor is generally good, and use remains light to moderate. More preferred species such as mountain big sagebrush and bitterbrush remain in very low densities without much of a chance of expanding in the future. High competition from the abundant and weedy understory makes reproduction of these preferred, low density species very difficult, especially in the current drought. Trend for the herbaceous understory is stable. Sum of nested frequency for herbaceous perennials remained identical to 1996 levels. Sum of nested frequency for perennial grasses significantly increased with the increase in bulbous bluegrass and Sandberg bluegrass. Sum of nested frequency for perennial forbs decreased. Annual species, especially grasses, decreased in sum of

nested frequency due to drought. The composition remains less than desirable with a high proportion of weedy species being present.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 17

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	-	-	10	8	-	-	4	5	.09	.07
G	Agropyron spicatum	bc233	c254	a173	ab216	79	88	68	82	4.50	9.06
G	Agropyron trachycaulum	-	-	-	6	-	-	-	3	-	.13
G	Bromus japonicus (a)	-	-	b211	a42	-	-	70	20	1.26	.17
G	Bromus tectorum (a)	-	-	b132	a53	-	-	41	23	1.42	.60
G	Danthonia californica	-	-	-	1	-	-	-	1	-	.03
G	Dactylis glomerata	a-	a-	a-	b15	-	-	-	5	-	1.55
G	Koeleria cristata	-	-	2	-	-	-	1	-	.00	-
G	Melica bulbosa	b42	ab26	ab28	a8	18	11	11	4	.20	.07
G	Poa bulbosa	a4	a30	b265	c315	1	14	81	92	9.23	20.61
G	Poa pratensis	-	-	-	-	-	-	-	-	-	.00
G	Poa secunda	155	239	32	143	58	85	14	59	.53	3.48
G	Stipa columbiana	a1	a1	b43	a-	1	1	16	-	1.00	-
Total for Annual Grasses		0	0	343	95	0	0	111	43	2.69	0.77
Total for Perennial Grasses		435	550	553	712	157	199	195	251	15.58	35.03
Total for Grasses		435	550	896	807	157	199	306	294	18.27	35.81
F	Achillea millefolium	ab9	a3	b19	ab9	5	1	9	4	.31	.16
F	Agoseris glauca	ab20	b33	ab21	a11	11	19	11	7	.13	.07
F	Allium spp.	b38	a-	a-	a3	20	-	-	1	-	.00
F	Arabis spp.	-	-	1	-	-	-	1	-	.00	-
F	Artemisia ludoviciana	b71	b45	a5	a11	25	20	2	5	.06	.33
F	Astragalus beckwithii	-	-	3	-	-	-	1	-	.03	-
F	Aster chilensis	b69	b70	a21	b46	23	24	8	18	.92	2.21
F	Balsamorhiza sagittata	b18	a6	a1	a4	9	4	1	2	.21	.45
F	Borago officinalis	8	-	-	-	3	-	-	-	-	-
F	Calochortus nuttallii	5	2	-	-	4	1	-	-	-	-
F	Castilleja spp.	-	4	1	2	-	1	1	2	.03	.06
F	Cirsium spp.	10	10	5	3	6	5	3	1	.04	.03

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
F	Collomia linearis (a)	-	-	$_{b}$23	$_{a}$10	-	-	10	5	.71	.05
F	Comandra pallida	7	4	7	-	3	4	3	-	.18	-
F	Collinsia parviflora (a)	-	-	1	5	-	-	1	4	.00	.02
F	Crepis acuminata	3	-	-	-	1	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	1	-	.00
F	Draba spp. (a)	-	-	41	45	-	-	14	19	.12	.14
F	Eriogonum cernuum (a)	-	-	-	-	-	-	-	-	-	-
F	Erodium cicutarium (a)	-	-	$_{a}$1	$_{b}$21	-	-	1	11	.00	.34
F	Erigeron strigosis	-	-	11	5	-	-	5	3	.22	.01
F	Galium aparine (a)	-	-	1	-	-	-	1	-	.00	.00
F	Grindelia squarrosa	-	-	4	-	-	-	1	-	.03	-
F	Hackelia patens	$_{a}$-	$_{b}$26	$_{ab}$7	$_{a}$4	-	9	4	3	.19	.06
F	Holosteum umbellatum (a)	-	-	14	-	-	-	4	-	.16	-
F	Lappula occidentalis (a)	-	-	-	2	-	-	-	1	-	.03
F	Lactuca serriola	-	9	2	1	-	3	1	1	.00	.00
F	Lomatium dissectum	$_{a}$-	$_{a}$2	$_{b}$33	$_{b}$31	-	1	15	16	.37	1.47
F	Lupinus argenteus	1	5	3	4	1	3	1	2	.15	.63
F	Machaeranthera spp	-	-	57	-	-	-	22	-	.23	-
F	Microsteris gracilis (a)	-	-	-	1	-	-	-	1	-	.00
F	Phlox longifolia	-	-	-	1	-	-	-	1	-	.00
F	Polygonum douglasii (a)	-	-	14	-	-	-	7	-	.03	-
F	Senecio integerrimus	3	3	-	-	1	1	-	-	-	-
F	Taraxacum officinale	$_{a}$-	$_{a}$-	$_{ab}$8	$_{b}$12	-	-	4	5	.08	.02
F	Tragopogon dubius	$_{a}$4	$_{a}$11	$_{c}$169	$_{b}$81	2	7	71	36	2.69	1.62
F	Unknown forb-perennial	$_{b}$29	$_{a}$-	$_{a}$-	$_{a}$-	15	-	-	-	-	-
F	Viola spp.	-	-	-	1	-	-	-	1	-	.00
F	Wyethia amplexicaulis	$_{a}$14	$_{a}$10	$_{b}$44	$_{b}$35	5	5	18	18	3.80	3.68
Total for Annual Forbs		0	0	95	87	0	0	38	42	1.04	0.61
Total for Perennial Forbs		309	243	422	264	134	108	182	126	9.72	10.86
Total for Forbs		309	243	517	351	134	108	220	168	10.77	11.47

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 17

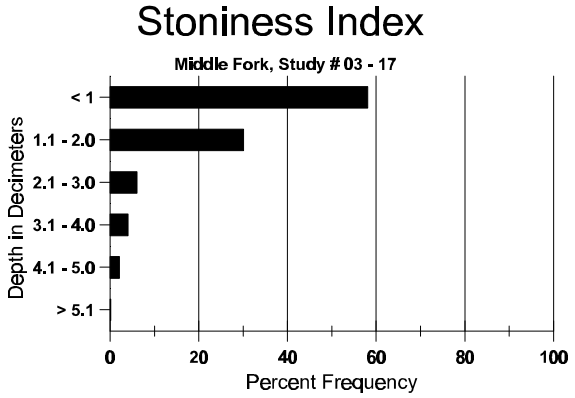
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Acer grandidentatum	2	1	1.25	1.70
B	Artemisia arbuscula	92	88	11.80	13.00
B	Artemisia tridentata vaseyana	7	1	1.49	.38
B	Gutierrezia sarothrae	9	17	.26	.53
B	Purshia tridentata	1	1	-	-
Total for Browse		111	108	14.81	15.62

BASIC COVER --
Herd unit 03 , Study no: 17

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '85	Average Cover % '90	Average Cover % '96	Average Cover % '01
Vegetation	382	365	9.25	12.00	48.04	56.20
Rock	264	224	14.50	15.75	19.16	19.40
Pavement	136	127	2.75	9.50	2.04	2.82
Litter	389	357	55.50	56.50	57.15	45.01
Cryptogams	83	82	1.00	.50	.52	1.67
Bare Ground	46	90	17.00	5.75	.34	2.26

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 17, Middle Fork

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
8.8	7602 (9.1)	6.4	38.6	32.4	29.0	3.6	13.8	105.6	.4



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 17

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	01	01
Rabbit	1	-	-	-
Elk	25	9	96	7 (18)
Deer	8	4	191	15 (36)
Cattle	-	1	-	-

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 17

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Acer grandidentatum																		
S	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	14	-	-	-	-	-	-	-	-	14	-	-	-	933			14
	90	6	-	-	2	-	-	2	-	-	10	-	-	-	666			10
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66	14	10	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	-33%
'90	00%	00%	00%	-94%
'96	00%	00%	00%	-50%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	999	Dec:	-
	'90	666		-
	'96	40		-
	'01	20		

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
Y	85	-	4	3	-	-	-	-	-	-	7	-	-	-	466			7
	90	-	8	-	-	-	-	-	-	-	8	-	-	-	533			8
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
D	85	-	-	1	-	-	1	-	-	-	1	-	-	1	133			2
	90	-	3	-	1	-	-	-	-	-	3	-	-	1	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	44%	56%	11%	+25%
'90	92%	00%	08%	
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	599	Dec:	22%	
'90	799		33%	
'96	0		0%	
'01	0		0%	

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia arbuscula																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	63	-	-	-	-	-	-	-	-	63	-	-	-	1260			63
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	16	-	-	-	-	-	-	-	-	16	-	-	-	1066			16
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	70	1	-	-	-	-	-	-	-	66	-	5	-	1420			71
	01	80	-	-	-	-	-	-	-	-	80	-	-	-	1600			80
M	85	77	-	-	-	-	-	-	-	-	67	-	10	-	5133	10	14	77
	90	21	25	4	-	-	-	-	-	-	50	-	-	-	3333	12	18	50
	96	132	88	2	-	-	-	-	-	-	203	-	19	-	4440	13	21	222
	01	239	49	2	3	-	-	-	-	-	287	1	5	-	5860	12	26	293
D	85	10	-	-	-	-	-	-	-	-	6	-	4	-	666			10
	90	29	25	3	-	-	-	-	-	-	35	-	-	22	3800			57
	96	15	23	-	-	-	-	-	-	-	24	-	8	6	760			38
	01	42	12	-	1	-	-	-	-	-	38	-	3	14	1100			55
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	780			39
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	500			25

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	14%	+ 5%
'90	47%	06%	20%	- 8%
'96	34%	.60%	11%	+23%
'01	14%	.46%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	6865	Dec:	10%
	'90	7199		53%
	'96	6620		11%
	'01	8560		13%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400	26	19	6
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	29	41	4
	96	6	3	-	-	-	-	-	-	-	9	-	-	-	180	26	47	9
	01	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4
D	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	2	1	-	-	-	-	-	-	-	2	-	-	1	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	-13%
'90	14%	00%	14%	-57%
'96	30%	00%	00%	-40%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	533	Dec:	25%
	'90	466		43%
	'96	200		0%
	'01	120		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	46	-	-	-	-	-	-	-	-	46	-	-	-	920			46
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133	12	9	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	9	11	1
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	9	11	10
	01	38	-	-	-	-	-	-	-	-	37	1	-	-	760	9	25	38

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	00%	00%	-50%
'90	00%	00%	00%	+84%
'96	00%	00%	00%	+47%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	133	Dec:	-
	'90	66		-
	'96	400		-
	'01	760		-

Purshia tridentata																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	-	-	1	-	-	-	-	-	-	1	-	-	-	66	8	24	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	11	31	1
	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40	20	54	2
	01	-	-	-	-	1	-	-	-	-	1	-	-	-	20	14	55	1
D	85	-	-	-	-	-	1	-	-	-	1	-	-	-	66			1
	90	1	1	-	-	-	-	-	-	-	1	-	-	1	133			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	00%	100%	00%	+60%
'90	40%	00%	20%	-88%
'96	100%	00%	00%	-50%
'01	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	132	Dec:	50%
	'90	332		40%
	'96	40		0%
	'01	20		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'85	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%
'01	00%	00%	00%

Total Plants/Acre (excluding Dead & Seedlings)			%Change	
	'85	0	Dec:	-
	'90	0		-
	'96	0		-
	'01	0		-

Trend Study 3-18-01

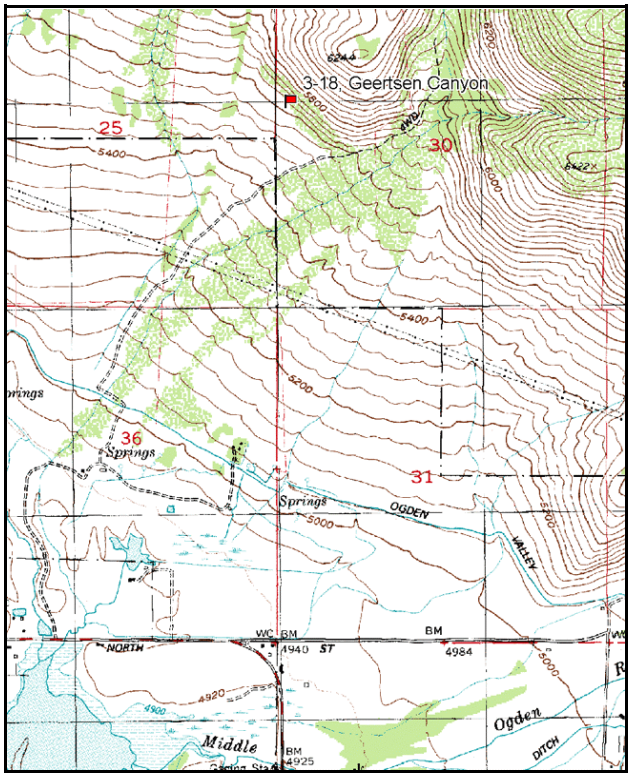
Study site name: Geertsen Canyon . Vegetation type: Big Sagebrush-Grass .

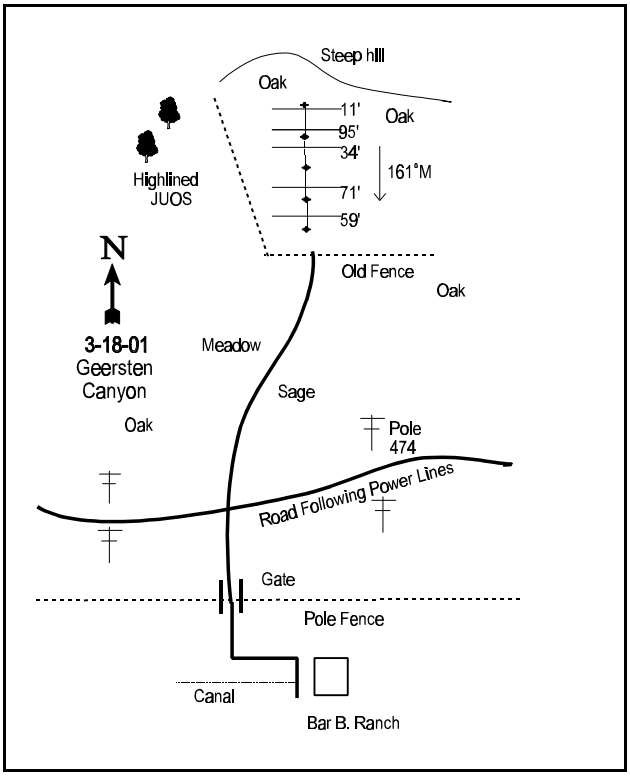
Compass bearing: frequency baseline 161 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (71ft), line 4 (59ft). Rebar: belt 1 on 1 ft., belt 2 on 0 ft., belt 3 on 2 ft., no rebar on belt 4, belt 5 on 3 ft.

LOCATION DESCRIPTION

Contact Bill Hadlock before doing this site. From the intersection of 5500 East and 2200 North in Eden, go south for 0.35 miles, then turn left and go 0.75 miles east to the Huntsville Stake Center. Continue east 0.2 miles to the gate of Bar B Ranch. Turn left through the gate and go 0.9 miles north up the ranch road past a farm house on the left to another gate. Park here and walk through this gate 0.2 miles to a road along a canal. Turn left and walk 0.1 miles north to a dirt road, then turn right and go 0.55 miles to the high tension power lines. Just to the east is power pole # 474. From pole 474, walk 1/3 of a mile at 11 degrees magnetic to the 0-foot baseline stake. The 0-foot baseline is marked by a 4-foot rebar stake (tagged #7026) located 100 feet down from the oak edge and 100 feet southwest of a large maple. The baseline runs 161 degrees magnetic.





Map Name: Huntsville

Diagrammatic Sketch

Township 7N , Range 2E , Section 30

UTM 4573966 N 435053 E

DISCUSSION

Trend Study No. 3-18

The Geertsen Canyon study samples a mountain big sagebrush/grass community located on a hillside north of the mouth of Geertsen Canyon. This study is on the Wolf Creek conservation easement that is managed by the DWR for wildlife and recreation. The site lies on a moderately steep, 25% slope with a southwest aspect. Elevation is approximately 5,500 feet. The area has been heavily grazed by horses and cattle in the past, but current livestock use is light. Livestock use was estimated at 3 cow days use/acre (7 cdu/ha) from pellet group transect data taken in 2001. The Geertsen Hollow area is known for wintering concentrations of deer. The permanent nearby pellet group transect has measured high levels of use in the past. The average from 1980-85 was 39 deer days use/acre (97 ddu/ha) the highest on the herd unit (Jense et al. 1985). Two deer antlers and one large elk antler were found on the site during the 1985 reading. In 1996, elk pellets were sampled in moderate amounts (27% quadrat frequency), while that of deer showed low quadrat frequencies (4%). In 2001, pellet group transect data estimated 13 elk days use/acre (31 edu/ha) and 15 deer days use/acre (36 ddu/ha). Wild turkeys were sited on the hike into the study in 2001.

Soils in the area are formed from a weathered conglomerate of sandstone and quartzite. The soil is deep and well-drained but permeability is slow due to clay in the subsoil (USDA 1980). Soils at the site are extremely rocky on the surface and throughout the profile. Due to the rocky nature of the soil, effective rooting depth (see methods) was estimated at less than 6 inches. Soil on the site has a sandy clay loam to clay loam texture and is slightly acidic in reactivity (pH of 6.2). The hazard of erosion is high if unprotected, but the area has an adequate covering of vegetation and litter. An erosion condition classification determined soils to be in stable condition in 2001. Rocks and pavement make up 14% of the surface cover. Due to the shallow, rocky nature of the soil profile, soil temperature was extremely high at nearly 80°F in 1996. Temperatures this high often indicate vulnerability to weed invasion as well as difficultly in shrub reproduction. This site suffers from both of these problems.

Mountain big sagebrush is the only important browse species present on this site. Density of mountain big sagebrush was estimated at 1,860 plants/acre in 1996, which is relatively sparse for mountain big sagebrush. In 2001, density decreased to an estimated 1,020 plants/acre. Most of this decrease is due to the loss of young plants in the population since 1996. Young sagebrush plants were very abundant in 1996 (1,140 plants/acre) but no young plants were sampled in 2001. Sagebrush reproduction will be difficult on this site in the future due to the shallow, rocky soils with high temperatures and drought conditions. Percent decadency, also influenced by drought, increased from 6% in 1996 to 16% in 2001. However, this is still low for sagebrush. Use is light to moderate as vigor has been generally normal throughout most of the population in 1996 and 2001. Mountain big sagebrush exhibits a rather low growth form at this site, most likely due to the shallow, rocky soils. Mature sagebrush average 1½ feet tall by 2 feet wide. Between 1996 and 2001, sagebrush also decreased in strip frequency from 41 to 30. Average leader growth was 2.5 inches in 2001.

Oak and maple are found further up the slope and along the creek. Some of the oak and junipers nearby have been high-lined. Broom snakeweed was picked up in the larger sample used in 1996. Density was estimated at 740 plants/acre in 1996, but no snakeweed plants were sampled in 2001. Snakeweed densities can fluctuate with changes in precipitation which appears to be the case at this site with drought conditions of the past 2 years (2000-2001).

The herbaceous vegetation accounts for most of the cover on the site. However, composition is extremely poor. Bulbous bluegrass has been the most abundant perennial grass in all sampling years. This species accounted for 77% of the grass cover in 1996, increasing to 90% in 2001. This species was sampled in nearly every quadrat in all readings. Currently (‘01) it provides over 42% average cover. Bulbous bluegrass can

provide early spring forage and fair erosion control. However, like cheatgrass, it dries up early in the season and can become a fire hazard. It also forms a dense mat when abundant and becomes highly competitive with desirable perennials, including shrubs. Other, more high-yielding, long-lived perennial species are present in very low numbers. These species include bluebunch wheatgrass, thickspike wheatgrass, Kentucky bluegrass and Letterman needlegrass. Annual brome grasses, especially Japanese brome, were very abundant in 1996. Japanese brome significantly decreased in nested frequency in 2001, providing less than half of the cover it did in 1996.

Forb composition is extremely poor. Many of the more common forbs are considered weeds, although they may provide some big game forage in the spring. Weedy increasers include ragweed, pacific aster, tarweed, curlycup gumweed, yellow salsify and moth Mullen. These species accounted for 81% of the forb cover in 1996. The noxious weed, Dyers woad, is also present in small numbers. Sum of nested frequency for perennial forbs decreased by nearly half between 1996 and 2001. Annual forbs are very abundant, especially storksbill, which increased 10-fold in nested frequency and provides 16% average cover in 2001. Other annual species, most notably tarweed, were abundant in 1996, but significantly decreased in 2001. It was reported in the 1985 that caterpillars and grasshoppers did considerable damage to the herbaceous vegetation that summer. In 1996, some of the yellow salsify had been utilized, most likely by elk.

1985 APPARENT TREND ASSESSMENT

The vegetative trend appears to be upward in terms of deer winter range. The sagebrush is increasing and there is a dense stand of bulbous bluegrass. Livestock grazing should be restricted as dense grasses are abundant and interfere with sagebrush seedling establishment. A rest from grazing will allow the more palatable and desirable species to recover and compete with the invader species that are present.

1990 TREND ASSESSMENT

Mountain big sagebrush displays characteristics of a downward trend on this winter range. Compared to 1985, there are significantly fewer young sagebrush and a large increase in the percentage of decadent plants which has gone from 10% to 77%. Increased decadency, reduced vigor, and low growth is due mostly to moisture stress. Bulbous bluegrass forms an almost complete ground cover. Other grasses are relatively uncommon.

> TREND ASSESSMENT
> soil - stable (3)
> browse - down (1)
> herbaceous understory - down, poor condition because of the very high densities for the increaser, bulbous bluegrass (1)

1996 TREND ASSESSMENT

Trend for soil is up due to a large decline in percent bare ground from 12% to 1%. Litter cover declined but this is likely due to misidentification of dried up bulbous bluegrass as litter cover instead of vegetation cover. There is currently no erosion problem on the site due to abundant vegetation and litter cover. Trend for mountain big sagebrush is up due to an increase in density, a decline in decadence, and an improvement in vigor. The stand contains an adequate number of seedlings and abundant young plants. Utilization is currently light to moderate. The herbaceous understory trend is stable. However, composition is extremely poor. The grass component is dominated by bulbous bluegrass and annual brome grasses which combine to produce 97% of the grass cover. Sum of nested frequency for perennial grasses is similar to 1990 estimates. The forb composition is also poor with undesirable weeds being dominate. It appears that tarweed was

present in 1985, but was identified as an unknown forb. In 1990, tarweed was likely present but not counted because it is an annual. Sum of nested frequency of perennial forbs has increased dramatically. However, due to the poor composition, trend is considered down slightly.

TREND ASSESSMENT
soil - up (5)
browse - up (5)
herbaceous - down slightly due to increasingly poor composition (2)

2001 TREND ASSESSMENT

Trend for soil is stable. Erosion remains minimal with a dense mat of bulbous bluegrass protecting the ground surface. Very little bare ground exists on the site. Trend for the key browse, mountain big sagebrush, is slightly down. Recruitment from young plants decreased from 61% in 1996 to 0% in 2001. Strip frequency of sagebrush decreased from 41% to 30%, and percent decadency increased slightly to 16%. A decline in strip frequency is due most likely to the loss of young plants in the population which is a result of drought and high competition from the abundant and weedy understory. Better precipitation in the future may help increase the number of young plants somewhat, but the young plants will likely have a difficult time persisting at the site due to the dominance of bulbous bluegrass. Trend for the herbaceous understory is stable, but remains in poor condition as bulbous bluegrass continues to dominate the site. Desired perennial grasses are present in low abundance, but will likely not increase. Forbs are dominated by annuals and weedy perennials. Annual grasses and perennial forbs did decrease in sum of nested frequency, but the dominance of bulbous bluegrass counteracts this.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable, but remains in poor condition (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 18

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
G	Agropyron dasystachyum	3	-	1	-	1	-	1	-	.00	-
G	Agropyron spicatum	a-	b11	ab2	ab5	-	5	2	2	.18	.44
G	Bromus japonicus (a)	-	-	b328	a211	-	-	96	80	8.00	3.34
G	Bromus tectorum (a)	-	-	b29	a9	-	-	10	5	.29	.07
G	Danthonia californica	-	-	-	4	-	-	-	2	-	.06
G	Poa bulbosa	b366	a355	ab365	ab361	98	100	98	99	32.20	42.65
G	Poa pratensis	a-	a-	a5	b15	-	-	2	6	.03	.08
G	Poa secunda	a5	b14	b14	b18	2	6	5	7	.02	.40
G	Stipa lettermani	a-	a-	b28	a11	-	-	12	4	.96	.42
Total for Annual Grasses		0	0	357	220	0	0	106	85	8.29	3.42
Total for Perennial Grasses		374	380	415	414	101	111	120	120	33.41	44.06
Total for Grasses		374	380	772	634	101	111	226	205	41.71	47.48
F	Achillea millefolium	a12	ab13	b32	ab14	5	6	13	8	.38	.31
F	Agoseris glauca	1	5	3	1	1	2	1	1	.00	.00
F	Allium spp.	12	-	-	-	5	-	-	-	-	-
F	Ambrosia psilostachya	b97	a11	b125	b102	34	6	46	42	2.45	1.58
F	Artemisia ludoviciana	39	24	35	41	16	12	15	18	.79	1.74
F	Aster chilensis	a-	b121	c199	b170	-	49	69	64	4.63	3.09
F	Calochortus nuttallii	-	-	-	-	-	-	-	-	-	.00
F	Cirsium spp.	-	-	2	-	-	-	1	-	.00	-
F	Collomia linearis (a)	-	-	10	6	-	-	3	3	.21	.04
F	Comandra pallida	-	-	-	3	-	-	-	1	-	.03
F	Crepis acuminata	-	-	-	-	-	-	-	-	-	.03
F	Epilobium brachycarpum (a)	-	-	a-	b41	-	-	-	16	-	.10
F	Erodium cicutarium (a)	b19	a-	b29	c301	8	-	12	92	.23	16.00
F	Erigeron strigosis	b10	a-	ab3	b10	4	-	2	6	.03	.05
F	Eriogonum umbellatum	-	1	-	-	-	1	-	-	-	-
F	Grindelia squarrosa	a-	a1	b30	a-	-	1	12	-	.50	-
F	Isatis tinctoria	-	-	1	-	-	-	1	-	.06	-
F	Lappula occidentalis (a)	-	-	b19	a-	-	-	9	-	.21	-
F	Lactuca serriola	a-	a-	b45	b66	-	-	21	30	.20	1.44
F	Lomatium spp.	-	5	1	6	-	3	1	3	.00	.18
F	Machaeranthera canescens	a-	a-	b190	a-	-	-	71	-	1.07	-
F	Madia glomerata (a)	-	-	b269	a55	-	-	91	24	3.99	.24

Type	Species	Nested Frequency				Quadrat Frequency				Average Cover %	
		'85	'90	'96	'01	'85	'90	'96	'01	'96	'01
F	Melilotus alba	-	-	-	3	-	-	-	1	-	.03
F	Phlox longifolia	-	-	-	2	-	-	-	1	-	.00
F	Polygonum douglasii (a)	-	-	2	-	-	-	1	-	.00	-
F	Ranunculus testiculatus (a)	-	-	-	2	-	-	-	1	-	.00
F	Rumex crispus	-	-	2	1	-	-	1	1	.03	.04
F	Taraxacum officinale	-	-	-	4	-	-	-	2	-	.01
F	Tragopogon dubius	$_{b}$26	$_{a}$5	$_{c}$126	$_{b}$12	15	2	57	7	1.43	.11
F	Unknown forb-perennial	$_{b}$337	$_{a}$-	$_{a}$-	$_{a}$-	120	-	-	-	-	-
F	Verbascum blattaria	$_{a}$3	$_{a}$-	$_{b}$33	$_{ab}$16	1	-	16	7	.79	.20
Total for Annual Forbs		19	0	329	405	8	0	116	136	4.65	16.39
Total for Perennial Forbs		537	186	827	451	201	82	327	192	12.40	8.88
Total for Forbs		556	186	1156	856	209	82	443	328	17.06	25.28

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 18

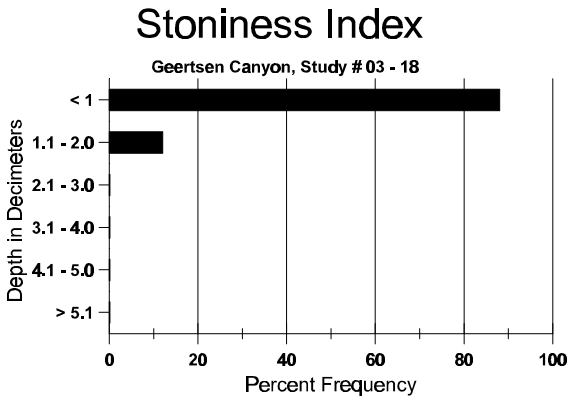
Type	Species	Strip Frequency		Average Cover %	
		'96	'01	'96	'01
B	Artemisia tridentata vaseyana	41	30	2.25	2.86
B	Gutierrezia sarothrae	12	0	.24	-
Total for Browse		53	30	2.49	2.86

BASIC COVER --
Herd unit 03 , Study no: 18

Cover Type	Nested Frequency		Average Cover %			
	'96	'01	'85	'90	'96	'01
Vegetation	389	380	16.75	7.75	62.06	70.66
Rock	218	210	11.25	10.25	11.92	13.47
Pavement	146	108	4.25	4.25	.96	.93
Litter	384	341	48.50	65.50	35.29	32.29
Cryptogams	7	-	1.00	.25	.04	0
Bare Ground	139	103	18.25	12.00	1.08	1.07

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 18, Geertsen Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
5.6	79.8 (4.22)	6.2	44.7	27.0	28.3	3.0	14.5	153.6	.6



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 18

Type	Quadrat Frequency		Pellet Transect	
	'96	'01	Pellet Groups per Acre ⁄01	Days Use per Acre (ha) ⁄01
Elk	27	2	165	13 (31)
Deer	4	11	191	15 (36)
Cattle	4	7	35	3 (7)

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 18

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	7	1	-	-	-	-	-	-	-	8	-	-	-	533			8
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	51	-	-	6	-	-	-	-	-	57	-	-	-	1140			57
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	19	-	-	-	-	-	-	-	-	19	-	-	-	1266	19	22	19
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133	12	16	2
	96	9	18	3	-	-	-	-	-	-	27	-	3	-	600	18	38	30
	01	15	28	-	-	-	-	-	-	-	42	1	-	-	860	17	24	43
D	85	3	-	-	-	-	-	-	-	-	2	-	1	-	200			3
	90	11	2	-	-	-	-	-	-	-	1	-	-	12	866			13
	96	4	2	-	-	-	-	-	-	-	3	-	1	2	120			6
	01	6	1	1	-	-	-	-	-	-	5	-	-	3	160			8
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260			13
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'85	03%	00%	03%	-43%
'90	24%	00%	71%	+39%
'96	22%	03%	06%	-45%
'01	57%	02%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
'85	1999	Dec:		10%
'90	1132			77%
'96	1860			6%
'01	1020			16%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560	11	16	28
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'85	00%	00%	00%
'90	00%	00%	00%
'96	00%	00%	00%
'01	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'85	0	Dec:	-
	'90	0		-
	'96	740		-
	'01	0		-

*****Suspended*****

Trend Study 3-19-96

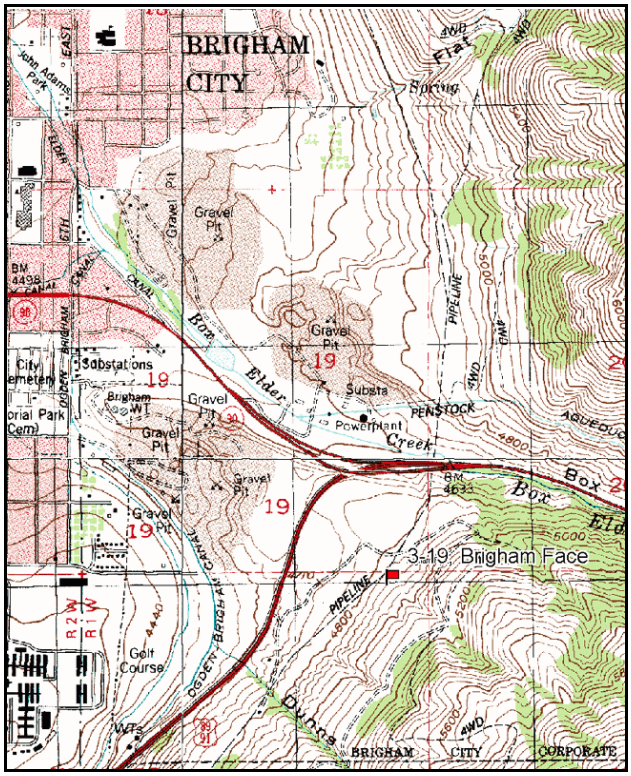
Study site name: Brigham Face . Vegetation type: Bitterbrush .

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

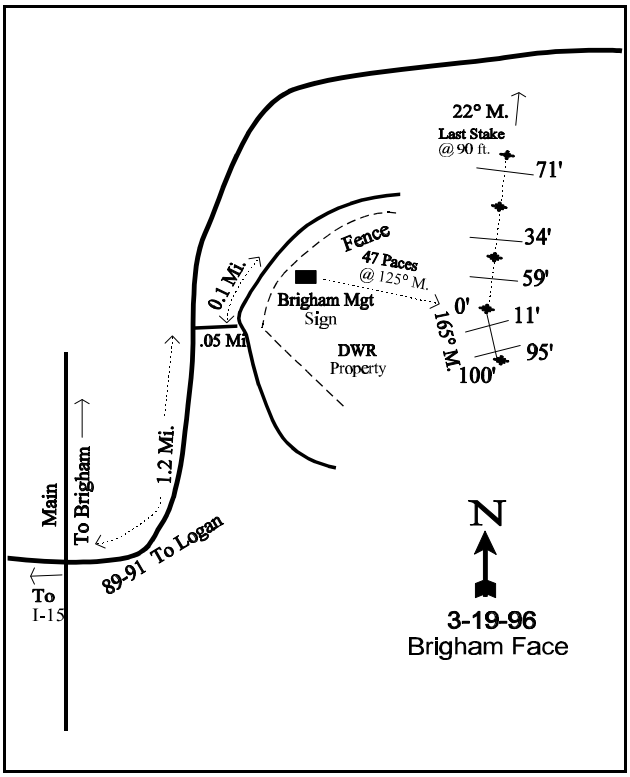
LOCATION DESCRIPTION

From 1100 South and Main Street in Brigham City, proceed northeast for 1.2 miles and turn right (east) at 1250 East. Turn left after 0.05 miles and enter DWR property. Travel 0.1 miles to the Brigham Management Area sign on the south side of the road. From the sign, walk 56 paces bearing 125 degrees magnetic to the 0-foot baseline stake. The 0-foot baseline stake is marked by browse tag # 87. The first 100 feet of the baseline runs 165 degrees magnetic. The remaining 300 feet run off the 0-foot baseline stake and run 22 degrees magnetic.



Map Name: Mantua

Township 9N , Range 1W , Section 19



Diagrammatic Sketch

UTM 4594140 N 417014 E

DISCUSSION

Trend Study No. 3-19 (2-11)

*****SUSPENDED** - This site was suspended in 2001 and will be reevaluated in 2006. The transect samples an old patch of bitterbrush that was seeded in the 1960's. This study was evaluated by the Project Leader and determined that very little or no wildlife use was present on the site due to the tall, thick nature of the bitterbrush patch that now is present. Text and data tables are included from the 1996 report.

The Brigham Face study samples what in the past was considered critical deer winter range located on Division of Wildlife Resources property on the old lake terrace immediately east of the Intermountain Indian School. The lake terrace has a gently (10%), northwest facing slope occupied by a dense stand of seeded grass interspersed by an antelope bitterbrush seeding and a persistent stand of mountain big sagebrush. Deer use was classified as moderately heavy in 1984, but current (‘96) use is light and deer pellet groups were infrequently encountered. The major impact to this area is associated with proximity to residential development and off-road vehicle use.

Soil on the site is typical of the "Wasatch" series. These are gravelly, sandy loams that most often have a gravelly subsoil. They are alluvially deposited and derived from quartzite, gneiss and schist. Wasatch soils are highly permeable and have low water-holding capacity. The erosion hazard ranges from moderate to high (Chadwick et al. 1975). At the site, effective rooting depth (see methods) was estimated at just over 12 inches in 1996. However, due to the rocky nature of the soil this estimate was limited because of the rocky subsoils, and rooting depth does not appear to be physically inhibited. Soil reaction is slightly acidic (6.2 pH). Soil texture is a sandy loam and erosion is controlled by a dense stand of seeded grass. Several roads and ORV trails in the area are the major source of soil disturbance and movement.

Browse composition consists of two species. Most conspicuous is an irregularly distributed population of a tall form of antelope bitterbrush. These were established with the aid of a "browse seeder" in the early 1960's and have since become large shrubs averaging 5 and more feet in height with a crown diameter of almost 9 feet. Total cover for bitterbrush is nearly 17%. Overall density is rather low at 580 plants/acre and the age structure suggests that bitterbrush is maintaining itself but is not apparently expanding. Utilization was heavy in 1984, when 60% of the shrubs displayed moderately heavy browsing (>60% of twigs browsed). Since then use has been classified as light.

Mountain big sagebrush also occurs on the site. Density estimates have increased from 199 plants/acre in 1984 to 1,700 in 1996. The increase in density is mostly due to the much larger sample size used in 1996, which better estimates densities of shrubs that often have aggregated and/or discontinues distributions. However, a large proportion of the sagebrush (65%) consists of small young plants. Mature shrubs number 600 plants/acre. Total cover for sagebrush is only 4%. Utilization was heavy in 1984 and percent decadence was relatively high at 50%. Since then use has been classified as light. Vigor has improved and no decadent plants were encountered on the site.

The seeded perennial grass, intermediate wheatgrass, is the principal vegetative component. It provides 31% cover or 93% of the grass cover, which accounts for over half of the total vegetative cover (56%). The only other common perennial grass is Sandberg bluegrass. Annual brome grasses which are so dominant on most sites in the unit accounts for less than 1% cover because of the competition with perennial grasses.

Perennial forbs are rare and difficult to find within the dense grass cover. All forbs combined produced less than 1% cover in 1996, only 2% of the total herbaceous cover. The tallest and most conspicuous forbs are yellow salsify and dyers woad.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable because of high quadrat frequencies for intermediate wheatgrass. Vegetative reconnaissance appears to indicate that mountain big sagebrush is probably declining in number while bitterbrush is just maintaining itself. A dense stand of intermediate wheatgrass dominates the site and will continue to do so. With the exception of mountain big sagebrush, vegetative trend is apparently stable.

1990 TREND ASSESSMENT

Browse remains limited on this DWR winter range, but both mountain big sagebrush and bitterbrush show meaningful increases. The increase in bitterbrush density is due to the high number of seedling and young plants. The sagebrush stand also has a high percentage of young plants. These shrubs have excellent vigor and show surprisingly low utilization along with very little sign of deer. Nested and quadrat frequency values for crested wheatgrass have increased a small amount, while values for intermediate wheatgrass have decreased slightly. This change would be expected because of the extended drought we are experiencing, as crested wheatgrass is more drought tolerant than intermediate wheatgrass. Still, quadrat frequency for intermediate wheatgrass is over 90%. Weedy increasers should be monitored closely, especially dyers woad, which did not appear on the 1984 survey, but had a quadrat frequency of 17% in 1990. There is still more than adequate ground cover for soil protection.

TREND ASSESSMENT
soil - stable (3)
browse - upward for key browse species (5)
herbaceous understory - stable, but weedy species should be closely monitored (3)

1996 TREND ASSESSMENT

Protective ground cover remains abundant and erosion is not apparent. Trend for soil continues to be stable. Trend for browse is stable for mountain big sagebrush and antelope bitterbrush. The respective changes in density of these two shrubs is more a reflection of the increased sample size used in 1996 than an actual increase or decrease in density. Both species are only lightly utilized, have good vigor and no decadent plants. However, the age class composition of the sagebrush would indicate an expanding population. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses increased slightly, while frequency of forbs declined slightly. Nested frequency of intermediate wheatgrass increased significantly since 1990 with the frequency of Sandberg bluegrass declining significantly.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 19

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	'96
G	Agropyron cristatum	$_{a}$3	$_{b}$19	$_{a}$1	1	8	1	.06
G	Agropyron intermedium	$_{b}$326	$_{a}$265	$_{b}$341	99	93	96	30.77
G	Bromus brizaeformis (a)	-	-	44	-	-	17	.21
G	Bromus japonicus (a)	-	-	34	-	-	14	.17
G	Bromus tectorum (a)	-	-	36	-	-	15	.32
G	Poa bulbosa	$_{a}$6	$_{b}$31	$_{b}$28	2	13	12	.24
G	Poa pratensis	-	4	-	-	2	-	-
G	Poa secunda	$_{a}$22	$_{b}$80	$_{b}$55	12	33	21	1.24
Total for Annual Grasses		0	0	114	0	0	46	0.71
Total for Perennial Grasses		357	399	425	114	149	130	32.32
Total for Grasses		357	399	539	114	149	176	33.03
F	Agoseris glauca	-	2	-	-	1	-	-
F	Alyssum alyssoides (a)	-	-	2	-	-	1	.00
F	Ambrosia psilostachya	-	-	3	-	-	1	.03
F	Collomia linearis (a)	-	-	1	-	-	1	.00
F	Cryptantha spp.	-	-	3	-	-	1	.00
F	Draba spp. (a)	-	-	10	-	-	3	.04
F	Epilobium brachycarpum (a)	-	-	4	-	-	3	.01
F	Galium aparine (a)	-	-	7	-	-	3	.16
F	Hackelia patens	-	-	4	-	-	2	.03
F	Helianthus annuus (a)	-	7	-	-	4	-	-
F	Holosteum umbellatum (a)	-	-	13	-	-	6	.03
F	Isatis tinctoria	$_{a}$-	$_{c}$42	$_{b}$19	-	17	9	.45
F	Lappula occidentalis (a)	-	-	1	-	-	1	.00
F	Lactuca serriola	$_{a}$-	$_{b}$9	$_{a}$-	-	5	-	-
F	Phlox longifolia	-	-	1	-	-	1	.00
F	Plantago patagonica (a)	-	-	7	-	-	3	.01
F	Polygonum douglasii (a)	-	-	40	-	-	18	.09
F	Taraxacum officinale	1	-	-	1	-	-	-
F	Tragopogon dubius	$_{a}$2	$_{b}$20	$_{a}$-	1	12	-	-
F	Unknown forb-perennial	-	1	-	-	1	-	-
Total for Annual Forbs		0	7	85	0	4	39	0.36
Total for Perennial Forbs		3	74	30	2	36	14	0.53
Total for Forbs		3	81	115	2	40	53	0.89

Values with different subscript letters are significantly different at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 03 , Study no: 19

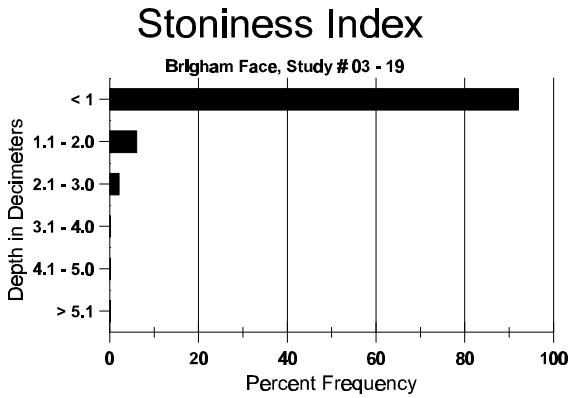
Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	20	3.94
B	Atriplex canescens	2	.38
B	Chrysothamnus nauseosus albicaulis	2	.30
B	Opuntia fragilis	2	-
B	Purshia tridentata	21	16.61
Total for Browse		47	21.23

BASIC COVER --
Herd unit 03 , Study no: 19

Cover Type	Nested Frequency '96	Average Cover % '84	'90	'96
Vegetation	363	.75	10.50	55.27
Rock	83	1.50	3.25	2.13
Pavement	84	7.00	9.75	.82
Litter	399	88.75	73.00	77.75
Cryptogams	17	0	0	.30
Bare Ground	64	2.00	3.50	.63

SOIL ANALYSIS DATA --
Herd Unit 03, Study no: 19, Brigham Face

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.3	62.8 (16.0)	6.2	58.7	22.0	19.3	3.2	21.4	208.0	.5



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 19

Type	Quadrat Frequency '96
Rabbit	5
Deer	4

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 19

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	96	55	-	-	-	-	-	-	-	-	55	-	-	-	1100			55
M	84	1	-	1	-	-	-	-	-	-	2	-	-	-	66	15	10	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	30	31	1
	96	28	1	-	1	-	-	-	-	-	30	-	-	-	600	26	39	30
D	84	-	2	1	-	-	-	-	-	-	-	-	3	-	100			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	50%	33%	50%	+33%
'90	00%	00%	00%	+82%
'96	01%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	199	Dec:		50%
'90	299			0%
'96	1700			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Atriplex canescens																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80	54	41	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	25%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	-
	'90	0		-
	'96	80		-

Chrysothamnus nauseosus albicaulis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	11	-	-	-	-	-	-	-	-	11	-	-	-	366			11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	21	28	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	-89%
'96	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	0	Dec:	0%
	'90	366		0%
	'96	40		50%

Juniperus osteosperma																		
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	69	94	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	100%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'84	66	Dec:	-
	'90	0		-
	'96	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia fragilis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	8	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	00%	00%	00%	
'90	00%	00%	00%	
'96	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	0	Dec:		-
'90	0			-
'96	40			-

Purshia tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	13	-	-	3	-	-	-	-	-	16	-	-	-	533			16
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	9	-	-	-	-	-	-	-	-	9	-	-	-	300			9
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	-	2	3	-	-	-	-	-	-	5	-	-	-	166	58	68	5
	90	9	-	-	6	-	-	-	-	-	15	-	-	-	500	61	72	15
	96	17	1	-	-	7	-	-	-	-	25	-	-	-	500	59	105	25
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	1	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'84	40%	60%	00%	+79%
'90	00%	00%	00%	-28%
'96	34%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'84	166	Dec:		0%
'90	800			0%
'96	580			7%

SUMMARY

MANAGEMENT UNIT - 3 - OGDEN

Unit 3 contains a total of 17 trend studies. Twelve of these studies were established in 1984, the other five in 1985. All of the studies were reread in 1990 and 1996. In 2001, 8 studies were reread, while 9 studies were suspended. Studies were suspended for several reasons. These reasons included little to no wildlife use, urban development, and sites not being rehabilitated following wildfires resulting in the loss of key browse, primarily sagebrush. Suspended sites will be reevaluated during the next rotation to determine whether they will be reread or permanently deleted.

Unit Wide Trends

In 2001, a common finding on range trend studies in Unit 3 was the increase in nested frequency of bulbous bluegrass. This species significantly increased in nested frequency on 6 of the 8 trend studies that were read in 2001. This species is a low value perennial that has many characteristics of annual species. It is highly competitive, has low forage value after spring, and can increase the fire hazard when overly abundant. Studies in this unit have the added problem of poor forb composition. Weedy increasers, both annual and perennial species, are widespread and make up the majority of the forb component on most of the sites in the Ogden unit. These species include ragweed, prickly lettuce, yellow salsify, western yarrow, pacific aster, tarweed, curlycup gumweed, thistle, storksbill, and Dyers woad. Dyers woad is a noxious weed and is spreading rapidly in some areas of the unit.

A common finding on the unit in 1996 was the high average soil temperature. This is usually the result of abundant rock on the surface and in the profile or the result of a steep slope combined with a west or south aspect. This causes excessive drying of the surface soil horizons by early summer and gives winter annuals like cheatgrass a competitive advantage over more desirable perennial species. Extra care must be used when grazing these ranges during the spring as they can easily be pushed toward an annual grass dominated system.

A major factor influencing vegetative trends is drought. Precipitation data from several weather stations within management unit 3 show alternating wet and dry cycles since range trend study sites were first established in 1984. For the most part, the early to mid-1980's were above normal in precipitation, the late-1980's were drier than normal and the early to mid-1990's were again wetter than normal. From 1999 to the present, a trend of at or below normal precipitation has again emerged. Low snowpack during the winters and/or dry spring and summers in 2000 and 2001 occurred throughout many areas of Utah. Lower than normal precipitation, especially in consecutive years, likely plays a primary role in increased decadency and decreased reproduction in shrub populations, primarily big sagebrush. In 2001, low precipitation also resulted in the decrease in perennial forbs in unit 3. This same trend was observed in the northeast region during the summer 2000. In unit 3, sum of nested frequency for perennial forbs decreased on half of the trend studies read in 2001. In 2001, perennial grasses actually increased in sum of nested frequency on 7 of the 8 studies in unit 3, mostly due to the increase in bulbous bluegrass discussed above.

As a result of the high soil temperatures, the abundance of weedy species, extended drought and past heavy use, many sites now support limited browse densities. Wildfires burned through three sites prior to the 1996 rotation, effectively eliminating the browse component. Apparently, none of these burns were rehabilitated, leaving them vulnerable to future fires and further site deterioration. Overall use of the browse on sites which still support sufficient densities, is currently mostly light to some moderate.

Trend Summary

	Category	1984	1990	1996	2001
3-2 Northeast Mantua Reservoir	soil	est	3	5	3
	browse	est	5	3	3
	herbaceous understory	est	3	1	5
3-3 Clay Basin	soil	est	3	5	3
	browse	est	3	3	3
	herbaceous understory	est	4	2	4
3-4 Anderson Ranch	soil	est	3	5	3
	browse	est	5	3	3
	herbaceous understory	est	4	2	4
3-5 Mathias Canyon	soil	est	3	5	susp
	browse	est	3	3	susp
	herbaceous understory	est	3	1	susp
3-6 White's Orchard	soil	est	3	4	3
	browse	est	4	3	2
	herbaceous understory	est	3	2	2
3-7 Mouth of Pearson's Canyon	soil	est	3	5	susp
	browse	est	5	3	susp
	herbaceous understory	est	1	1	susp
3-8 Facer Canyon	soil	est	3	3	susp
	browse	est	5	1	susp
	herbaceous understory	est	1	1	susp
3-9 Cook Canyon	soil	est	3	5	3
	browse	est	3	3	2
	herbaceous understory	est	4	1	4
3-10 Hyrum Canyon	soil	est	4	5	susp
	browse	est	5	3	susp
	herbaceous understory	est	2	1	susp

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = site established, (susp) = suspended

	Category	1984	1990	1996	2001
3-12 Three-Mile Canyon	soil	est	3	5	3
	browse	est	1	3	2
	herbaceous understory	est	2	2	3
3-13 Perry Basin	soil	est	3	2	susp
	browse	est	2	1	susp
	herbaceous understory	est	5	3	susp
	Category	1985	1990	1996	2001
3-14 Uintah Junction	soil	est	3	5	susp
	browse	est	1	3	susp
	herbaceous understory	est	2	3	susp
3-15 Ogden Canyon	soil	est	3	4	susp
	browse	est	2	3	susp
	herbaceous understory	est	2	3	susp
3-16 Maple Canyon	soil	est	3	5	susp
	browse	est	3	1	susp
	herbaceous understory	est	2	1	susp
3-17 Middle Fork	soil	est	3	5	3
	browse	est	3	4	3
	herbaceous understory	est	3	2	3
3-18 Geertsen Canyon	soil	est	3	5	3
	browse	est	1	5	2
	herbaceous understory	est	1	2	3
	Category	1984	1990	1996	2001
3-19 Brigham Face	soil	est	3	3	susp
	browse	est	5	3	susp
	herbaceous understory	est	3	3	susp

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = site established, (susp) = suspended